

# MONTHLY WEATHER REVIEW.

VOL. XI.

WASHINGTON, D. C., JUNE, 1883.

No. 6.

## INTRODUCTION.

The month of June has not been marked by any unusual meteorological features.

Severe local storms occurred in many of the states, but they were not as numerous or as violent as those which occurred during the preceding months, April and May.

The most important feature of the month was the destructive floods in the lower Missouri river and in the Mississippi river, between Saint Louis, Missouri, and Cairo, Illinois.

In the Missouri valley the rainfall exceeded the June average by nearly three inches. Large excesses also occurred in the middle and south Atlantic states. Large deficiencies occurred in the extreme northwest, southern slope, and north Pacific coast region.

The mean temperature of June has been above the normal on the Atlantic coast and west of the Rocky mountains, and below the normal over the interior districts, but the departures, in general, are small.

The weather over the north Atlantic ocean during the month was generally fair with high barometric pressure, but dense fogs prevailed from the coast of the United States eastward to the fortieth meridian.

Chart ii. shows the paths of the centres of but three atmospheric depressions, and these exhibited very slight energy.

The ice chart shows that during June icebergs have drifted about three degrees farther to the eastward than in May, while the southern limit remains on the same parallel.

In the preparation of this REVIEW, the following data, received up to July 20th, have been used; viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-one Signal-Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and seventy-six monthly journals, and one hundred and sixty-six monthly means from the former, and fifteen monthly means from the latter; two hundred and forty-one monthly registers from voluntary observers; fifty-one monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Illinois, Indiana, Nebraska, New Jersey, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

## ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for the month of June, 1883, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart iii.

The regions of greatest mean pressure are the north Pacific coast, and the south Atlantic and Gulf states. In the north Pacific coast region, a small area is inclosed by the isobar of 30.05, the highest monthly means being 30.07 and 30.08, at Roseburg and Portland, Oregon, respectively. The high area covering the southeastern part of the country, is inclosed by the isobar of 30.0, which extends from eastern Texas to Virginia, and thence along the Atlantic coast to Nova Scotia. The highest barometric means recorded in this region were 30.05 at Cedar Keys and Jacksonville, Florida, and Augusta, Georgia.

The area of least mean pressure covers southern Arizona, New Mexico, southeastern Colorado, and western Texas. In southern Arizona, a small area is inclosed by the isobar of 29.75. The least monthly mean pressures, 29.74 and 29.75, are from Yuma and Camp Thomas, Arizona, respectively. Over the central Rocky mountains region, the extreme northwest, lake region, and Saint Lawrence valley, the monthly barometric means range from 29.80 to 29.90.

The mean atmospheric pressure of June, 1883, compared with that of the preceding month, shows a slight increase over the north Pacific coast region, and in the states bordering on the Atlantic. Over an area extending from western Illinois to eastern Colorado, and southward to the Texas coast, no change has occurred. In all other parts of the country, the mean pressure is below that of May, the changes being, in general, unimportant, but are most marked in the upper lake region, Arizona, and southern California, where they vary from .06 to .10.

## DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

On the Atlantic coast and west of the Missouri and lower Mississippi rivers, except in southern California, the mean pressure is above the June normal. The excess is greatest over the northern and middle slopes and in New England, the greatest departures being .08 at Boston, Massachusetts, and Fort Benton, Montana, and .09 at Denver, Colorado. Over an area extending from the lake region to the Gulf of Mexico the monthly barometric means vary from .01 to .07 below the normal, the departures being greatest in the lake region.

## BAROMETRIC RANGES.

The monthly barometric ranges were greatest in New England, where they, generally, exceeded 1.00. They were least in Florida, along the Gulf coast, and in Arizona. Between the Mississippi river and Rocky mountains north of the thirty-fifth parallel, the ranges were very uniform and varied between .50 and .60. In the several districts the monthly ranges varied as follows:

*New England.*—From 0.97 at New Haven, Connecticut, to 1.12 at Portland, Maine.

*Middle Atlantic states.*—From 0.61 at Cape Henry and Lynchburg, Virginia, to 1.04 at Albany, New York.

*South Atlantic states.*—From 0.37 at Jacksonville, Florida, to 0.52 at Macon, North Carolina.

*Florida peninsula.*—From 0.20 at Key West, to 0.31 at Cedar Keys.

*Eastern Gulf.*—From 0.32 at Pensacola, Florida, and New Orleans, Louisiana, to 0.44 at Starkville, Mississippi.

*Western Gulf.*—From 0.38 at Galveston, Texas, to 0.54 at Fort Smith and Little Rock, Arkansas.

*Ohio valley and Tennessee.*—From 0.43 at Chattanooga and Knoxville, Tennessee, to 0.76 at Indianapolis, Indiana.

*Lower lakes.*—From 0.83 at Cleveland and Toledo, Ohio, to 0.96 at Oswego, New York.

*Upper lakes.*—From 0.60 at Duluth, Minnesota, to 0.88 at Port Huron, Michigan.

*Extreme northwest.*—From 0.56 at Fort Buford Dakota, to 0.71 at Saint Vincent, Minnesota.

*Upper Mississippi valley.*—From 0.53 at Des Moines, Iowa, to 0.71 at Springfield, Illinois.

*Missouri valley.*—From 0.53 at Yankton, Dakota, and Omaha, Nebraska, to 0.59 at Huron and Fort Bennett, Dakota.

*Northern slope.*—From 0.51 at North Platte, Nebraska, to 0.57 at Fort Shaw, Montana.

*Middle slope.*—From 0.49 at Fort Elliott, Texas, to 0.58 at Dodge City, Kansas, and West Las Animas, Colorado.

*Southern slope.*—From 0.47 at Coleman City, Texas, to 0.48 at Fort Concho, Texas.

*Southern plateau.*—From 0.29 at Prescott, Arizona to 0.40 at El Paso, Texas.

*Northern plateau.*—From 0.65 at Spokane Falls, Washington Territory, to 0.74 at Lewiston, Idaho.

*North Pacific.*—0.59 at Roseburg, Oregon, to 0.61 at Portland, Oregon.

*Middle Pacific.*—From 0.47 at San Francisco, California, to 0.57 at Sacramento, California.

*South Pacific.*—From 0.32 at San Diego, California, to 0.52 at Visalia, California.

#### AREAS OF HIGH BAROMETER.

Four areas of high barometer have been observed within or near the limits of the United States during the month of June. The centre of greatest pressure in each case passed eastward north of the Ohio valley.

I.—This was the most clearly marked area of high pressure observed during the month. On the morning of the 1st it extended over all districts east of the Mississippi river, attended by clear cool weather, the barometer reading highest, 30.36 in the lower lake region. This area moved directly east during the 1st, 2d, and 3d, passing over New England and over the Atlantic, south of Nova Scotia. The barometric pressure increased to 30.50 and above as this area approached the coast, and it was followed by the strong east to northeast winds at the coast stations south of New York. A small depression developed in northern North Carolina on the 2d, causing violent local storms and very heavy rains near Wilmington and Cape Hatteras. The barometer continued high on the Atlantic coast on the 4th, but it was falling, with southerly winds, in advance of low area i., which was central north of the lake region.

High area ii. appeared in the upper Missouri valley on the morning of the 12th, and moved southeastward, following the general course of this valley, until the afternoon of the 13th, when it passed to the east of the Mississippi river, over Illinois and the states north of the Ohio valley. It was central in the lower lake region on the 14th, and during the 15th and 16th, it passed over the middle Atlantic states and New England, with increasing pressure as the centre approached the coast. This area, after reaching the Ohio valley, moved to the east, following the course of high area i., but on the 16th, the region of greatest pressure was near Halifax, Nova Scotia. Cool, clear weather continued in the districts on the Atlantic coast during the 14th, 15th, and 16th, after the showers caused by the cold northwest winds which preceded the advance of this area on the night of the 13th.

III.—This area was at no time central within the limits of the stations of observation, but it apparently advanced from the north Atlantic, gradually extended westward over the stations northeast of the middle Atlantic states on the 25th, 26th, and 27th. The pressure increased in the region named, while low-area vii. remained almost stationary near Lake Erie during the 25th and 26th. This area was also followed by the development of a disturbance on the south Atlantic coast, as

in the case of high-area i., when the region of greatest pressure was to the northeast of the disturbance.

IV.—This was a very slight increase of pressure which appeared north of the upper lake region on the 30th. It moved southward without marked energy, causing a fall of from 5° to 10° in temperature in the northeastern part of the United States. At the close of the month, 11 p. m. of the 30th, the pressure was greatest, 30.10, in the Ohio valley. The July reports show that it passed over the southern portion of the middle Atlantic states to the south Atlantic coast, where it remained almost stationary during the 1st, 2d, and 3d of July, attended by very warm southerly winds and fair weather in the eastern portion of the United States.

#### AREAS OF LOW BAROMETER.

Eight areas of low barometer have been traced over the United States and adjoining territories during the month of June, and the month closed with a well-marked depression central north of Minnesota. The tracks of the centres of these depressions are exhibited on chart i. The telegraphic reports from stations west of the Rocky mountains having been discontinued on the 1st of June, it has not been possible to trace these storms to the westward, but the reports indicate that numbers i., v., vi., and vii., originated to the west of the field of observation. Numbers vi. and vii. disappeared within the limits of the stations before reaching the Atlantic coast.

The following table shows the latitudes and longitudes in which each depression was first and last observed, and the hourly velocity of each depression:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	0° 7'	104° 00'	0° 7'	82° 00'	25.0
II.	52° 00'	101° 00'	51° 00'	63° 00'	29.5
III.	37° 00'	95° 00'	45° 00'	70° 00'	28.0
IV.	35° 00'	96° 00'	49° 00'	65° 00'	25.5
V.	42° 00'	101° 00'	48° 00'	73° 00'	15.0
VI.	38° 00'	105° 00'	40° 00'	86° 00'	33.0
VII.	45° 00'	89° 00'	43° 00'	81° 00'	16.5
VIII.	34° 00'	78° 00'	40° 00'	73° 00'	21.0
IX.	55° 00'	102° 00'			
Mean hourly velocity.....					
					24.2

I.—At the morning report of the 1st, this disturbance was central in Colorado, where the barometer read 29.65 at Denver. A second depression existed to the north of Minnesota at this report, the pressure at the centre of this second disturbance being at least .10 lower than that reported at Denver. The afternoon report of the 1st indicated the advance of this depression towards the lake region, although the barometer continued low in eastern Colorado. The storm to the north had disappeared to the north of the lake region, and the pressure had increased to 30.11 in the upper Missouri valley, with cool northerly winds; and general rains on the Atlantic coast, with warm south to west winds. This depression left the coast, moving slightly north of east, near the fiftieth parallel of latitude. On the morning of the 2d, the cool northerly winds extended over Nebraska, and heavy rains were reported from Missouri, Iowa, and southern Dakota. At this report, the centre of disturbance was in northern Iowa, but the depression was elliptical in form and extended from Lake Superior to central Texas, bounded by the isobarometric line of 29.90, the barometer being 30.40 on the Atlantic coast and 30.20 in Manitoba. This storm increased in energy as it passed over the upper lake region on the 2d and 3d, but dangerous winds did not occur at stations south of Lake Superior. At Duluth, Minnesota, and Marquette, Michigan, the wind reached velocities of thirty-two and thirty miles, respectively, from northeast and northwest. This storm disappeared to the northeast of Lake Huron on the night of the 3d, but later reports show that it followed the Saint Lawrence valley to the northeast.

II.—This disturbance was at no time within the limits of the stations of observation, but the telegraphic reports from the northern stations show that it was central north of Minnesota, on the 5th, and that it passed almost directly east during the 6th and 7th. Light showers occurred in the lake region.

III.—The afternoon chart of the 8th, exhibited an extended barometric depression in the lower Missouri valley with general rains in Missouri and Iowa and adjoining states. The winds indicated that the centre of disturbance was near Springfield, Missouri, at this report. This storm increased in severity during the succeeding eight hours, the barometer falling below 29.60, and the bounding isobars contracting and assuming a circular form. The rainfall in the central Mississippi valley was very heavy on the 8th. During the 9th, this storm passed over the southern portion of Michigan, over lake Huron, and north of the lower lake region, where it was central at the 11 p. m., observation of that day. Signals were ordered in advance at stations on Lakes Michigan and Huron, and at Detroit, but were only justified at Milwaukee and Detroit. After reaching the upper Saint Lawrence valley, this area moved eastward to the New England coast, where it disappeared on the afternoon of the 10th.

IV.—When the preceding disturbance moved northeastward from Missouri the pressure remained below the normal in the west Gulf states, and the cool winds from the north following storm number iii., resulted in the development of a second storm in the southwest on the following day. Very heavy rains occurred in the central Mississippi valley on the 10th, when this area was central in Missouri. The barometer was low in all districts at the afternoon report of the 10th, attended by general rains in the Gulf states and thence northward over the lake region, the centre of disturbance being in central Illinois. This storm continued its northeasterly course until it finally disappeared to the northeast of the Canadian stations, increasing greatly in energy as it passed over the lake region. When central near lake Huron the pressure at the centre was below 29.30, and dangerous winds were reported from stations on Lake Erie on the 11th. During the night of the 11th this storm inclined to the eastward, the centre passing to the east of the Saint Lawrence river to northern New England, after which it moved to the northeast and disappeared, the barometer being unusually low at the maritime stations on the 12th.

V.—This depression was first observed on the northern slope of the Rocky mountains on the 17th, but the reports indicate that it developed over the middle or southern plateau during the 15th and 16th. Moving eastward to the Missouri valley, where it was central near Omaha, Nebraska, at the afternoon report of the 17th, the course changed to the northeast, and during the night it passed over western Iowa and southern Minnesota, causing violent local storms and very heavy rains generally throughout the northwest and upper lake region. The centre passed over Lake Superior, near Marquette, Michigan, on the morning of the 18th, when the barometer fell to 29.50, and the winds became dangerous after shifting to the northwest. After passing to the north of the lake region, this storm remained almost stationary during the 19th and 20th, and finally disappeared before reaching the Atlantic coast, by a gradual increase of pressure in the northern districts.

Low area vi. developed in the middle plateau region on the 19th, but at no time was it well defined. The barometer fell to 29.70 at Denver, Colorado, on the 19th, and to 29.67 at North Platte, Nebraska, at the morning report of the 20th, accompanied by thunder storms and rain in the Missouri valley and Kansas. These storms advanced over Iowa, Missouri, and Illinois, during the 20th, when the centre of disturbance was in Missouri. The rains caused by this slight depression were very heavy in the central Mississippi and lower Ohio valleys, but it lost energy and was last observed in the lower Ohio valley, where it disappeared on the morning of the 21st.

VII.—This is the most marked depression of the month, owing to its unusual retardation after the centre reached the

lower lake region. It apparently developed near Lake Superior on the afternoon of the 23d and moved southeastward to the southern part of Lake Michigan, and thence to the northeast, the centre being immediately north of Lake Huron at 7 a. m. of the 24th. The central depression extended to the southward, covering the Ohio valley, and the barometric trough was thus located between an advancing high area in the northwest and a second high area which approached the Atlantic coast from the northeast. This distribution of pressure continued until the 26th, the area of low barometer becoming more contracted and remaining almost stationary near Lake Erie until the area of high pressure to the east had advanced over the Atlantic and the barometer fell at the Canadian stations, when the pressure rose slowly in the lake region.

VIII.—This was a secondary disturbance which formed over the south Atlantic coast immediately after the disappearance of low area vii. Its development was probably due to the southerly movement of the high area referred to in description of low area vii. This depression moved northward along the middle Atlantic coast, causing violent local storms near the coast. The following maximum wind-velocities occurred at the coast stations during this storm: Cape May, New Jersey, 50, nw.; Delaware Breakwater, Delaware, 48, nw.; Sandy Hook, New Jersey, 42, E.; Hatteras, North Carolina, 38, se.; Cape Henry, Virginia, 42, nw. This disturbance could not be traced to the north of the middle Atlantic coast, as it probably lost much of its energy and disappeared near Sandy Hook, New Jersey.

#### NORTH ATLANTIC STORMS DURING JUNE, 1883.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0—10.] Chart ii. exhibits the tracks of the principal depressions that have moved over the north Atlantic ocean during June, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic, and from other miscellaneous data received at this office up to July 21st. The observations used are, in general, simultaneous, being taken each day at 7 h. 0 m. a. m., Washington, or 0 h. 8 m. p. m., Greenwich mean time.

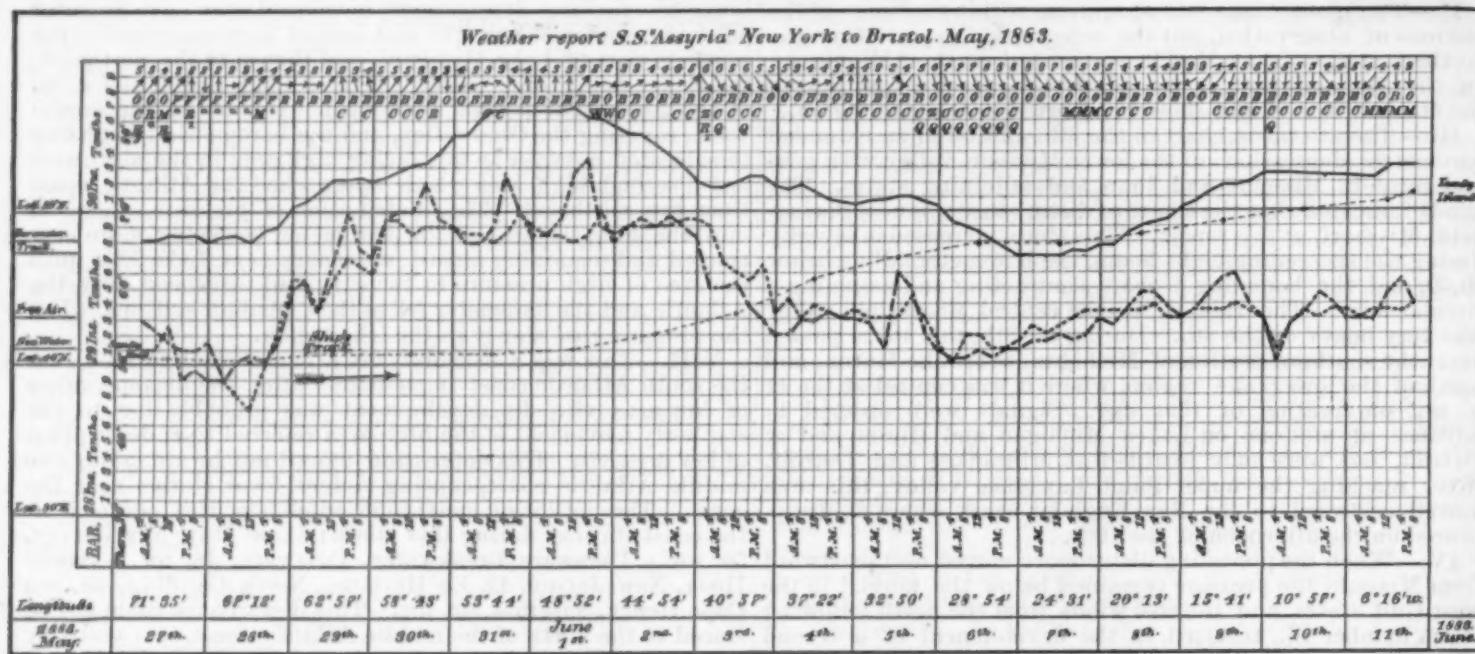
For the month of June, 1883, the approximate paths of three areas of barometric disturbance are charted; these are all east of the twenty-fifth meridian. None of the depressions traced to the coasts of the United States and Canada, (chart i.), have remained sufficiently well-defined, within the range of observation, to warrant a farther tracing of their paths; but numerous small, shallow depressions appear to have prevailed over the Atlantic during the month. These were of short duration and of limited extent, and did not exert any marked influence over the weather, beyond causing occasional rains and sudden changes of the wind, which, generally, did not exceed the force of a strong breeze or moderate gale.

The weather conditions over the Atlantic during the month may be summarized as follows: from the 1st to 8th, generally fair, with light to moderate breezes, variable in direction. From the 8th to 23d, generally light to moderate breezes, occasional rains and dense fogs from the fortieth meridian westward. From the 23d to the close of the month, cloudy weather and stormy breezes, increasing at times to moderate gales, prevailed to the eastward of W. 35°.

The barometric pressure was, in general, high throughout the month, particularly so in mid-ocean during the period from the 14th to 22d. Captain Hughes, of the s. s. "Alene," reported the barometric pressure as ranging from 30.4 (772.1) to 30.9 (784.8) from the 2d to 14th at the various ports in Hayti.

In connection with the subject of fog, Captain Brooks, of the s. s. "Arizona," reported having steamed through no less than 1,500 miles of fog during the voyage from Queenstown to New York, June 17th to 24th.

The following diagram shows the weather conditions over the Atlantic during the period from May 27th to June 11th, as reported by Captain Brown, of the s. s. "Assyria," on the passage from New York to Bristol:



an iceberg; s. s. "Elysia," in N.  $42^{\circ} 40'$ , W.  $52^{\circ} 40'$ , passed an iceberg.

4th.—S. S. "Lord Clive," from N.  $43^{\circ} 16'$ , W.  $48^{\circ} 50'$  to N.  $43^{\circ} 12'$ , W.  $48^{\circ} 39'$ , passed five icebergs; s. s. "Elysia," in N.  $42^{\circ} 30'$ , W.  $50^{\circ} 34'$ , passed an iceberg.

5th.—S. S. "Finchley," in N.  $42^{\circ} 15'$ , W.  $49^{\circ} 47'$ , passed several icebergs; s. s. "Amsterdam," in N.  $42^{\circ} 24'$ , W.  $50^{\circ} 04'$ , passed a large iceberg; s. s. "Azalea," in N.  $48^{\circ} 18'$ , W.  $44^{\circ} 51'$ , passed a large iceberg; also, in N.  $48^{\circ} 30'$ , W.  $43^{\circ} 00'$ , passed another.

6th.—S. S. "Elbe," in N.  $42^{\circ} 10'$ , W.  $49^{\circ} 46'$ , passed a small iceberg.

7th.—S. S. "Azalea," in N.  $43^{\circ} 30'$ , W.  $52^{\circ} 20'$ , passed an iceberg.

7th.—Saint John's, Newfoundland: thirty sealing schooners are reported fast in heavy field-ice in the northern part of Gulf of Saint Lawrence.

12th.—S. S. "Devon," at New York, reported: passed two large icebergs in N.  $48^{\circ} 14'$ , W.  $42^{\circ} 23'$ ; s. s. "Habsburg," in N.  $41^{\circ} 23'$ , W.  $48^{\circ} 55'$ , passed an iceberg; also, in N.  $41^{\circ} 29'$ , W.  $49^{\circ} 36'$ , passed another about one hundred and fifty feet high; s. s. "Fulda," in N.  $42^{\circ} 45'$ , W.  $48^{\circ} 39'$ , passed two large icebergs.

13th.—S. S. "Château Lafite," in N.  $40^{\circ} 28'$ , W.  $51^{\circ} 45'$ , passed an iceberg about eighty feet high; s. s. "Jason," in N.  $42^{\circ} 17'$ , W.  $55^{\circ} 09'$ , passed an iceberg; ship "Colchester," in N.  $42^{\circ} 30'$ , W.  $52^{\circ} 40'$ , passed two icebergs.

14th.—S. S. "Grecian Monarch," in N.  $47^{\circ} 42'$ , W.  $42^{\circ} 40'$ , passed a small iceberg. Captain Dale, of the s. s. "Dominion," reports: "At 8.40 p. m. of the 14th (between N.  $53^{\circ}$ , W.  $49^{\circ}$ , and N.  $51^{\circ}$  W.  $51^{\circ}$ ), ran into a quantity of field-ice; at midnight stopped engines, awaiting clear weather and daylight. At 3 a. m. of the 15th, weather clearing, found large quantities of field-ice about, so determined not to try a passage through the Straits of Belle Isle; shaped a course for Cape Race, and passed numerous icebergs up to 8 p. m.

15th.—Ship "Terpsichore," in N.  $43^{\circ} 50'$ , W.  $47^{\circ} 50'$ , passed three icebergs each about eighty feet high; s. s. "Wisconsin," in N.  $44^{\circ} 17'$ , W.  $46^{\circ} 26'$ , passed an iceberg; s. s. "Plantyn," in N.  $45^{\circ} 01'$ , W.  $47^{\circ} 16'$ , passed an iceberg about one hundred and ten feet high.

16th.—S. S. "Faraday," at New York, reported: passed several large icebergs between N.  $43^{\circ} 43'$ , W.  $47^{\circ} 09'$  and N.  $42^{\circ} 03'$ , W.  $52^{\circ} 32'$ ; s. s. "Ethiopia," in N.  $43^{\circ} 00'$ , W.  $47^{\circ} 31'$ , passed three icebergs; s. s. "Wyoming," in N.  $43^{\circ} 37'$ , W.  $46^{\circ} 07'$ , passed a large iceberg; also, in N.  $43^{\circ} 52'$ , W.  $45^{\circ} 40'$ , passed another.

17th.—S. S. "Joseph Ferens," in N.  $47^{\circ} 55'$ , W.  $43^{\circ} 10'$ , passed a large iceberg; s. s. "Elbe," in N.  $43^{\circ} 45'$ , W.  $46^{\circ} 11'$ , passed six miles north of a very large iceberg.

18th.—S. S. "City of Richmond," in N.  $43^{\circ} 30'$ , W.  $44^{\circ} 56'$ , passed an iceberg about one hundred feet high; s. s. "Rugia," in N.  $43^{\circ} 39'$ , W.  $45^{\circ} 10'$ , passed a large iceberg; s. s. "Joseph Ferens," in N.  $46^{\circ} 36'$ , W.  $47^{\circ} 45'$ , passed an iceberg.

NOTE.—The absence of reports between the 18th and 29th seems to indicate that the ice disappeared rapidly during the latter part of the month.

29th.—S. S. "Lord Gough," in N.  $48^{\circ} 32'$ , W.  $46^{\circ} 06'$ , passed an iceberg; also, in N.  $48^{\circ} 06'$ , W.  $48^{\circ} 02'$ , passed another.

#### TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada, for the month of June, 1883, is exhibited on chart iii., by the dotted isothermal lines.

In the first column of the following table is shown the normal temperature of June in the several districts, as determined from the Signal-Service records; the second column shows the mean temperature of June, 1883, and the third column shows the departure of June, 1883, from the normal.

Average Temperatures for June, 1883.

Districts.	Average for June, Signal Service observations.		Comparison of June, 1883, with the average for several years.
	For several years.	For 1883.	
New England	64.4	66.7	2.3 above.
Middle Atlantic states	70.5	71.7	1.2 above.
South Atlantic states	77.8	78.2	0.4 above.
Florida peninsula	81.7	82.3	0.6 above.
Eastern Gulf	79.4	79.0	0.4 below.
Western Gulf	80.5	80.4	0.1 below.
Tennessee	76.3	76.0	0.3 below.
Ohio valley	73.4	72.5	0.9 below.
Lower lakes	65.3	64.7	0.6 below.
Upper lakes	61.9	60.8	1.1 below.
Extreme northwest	61.6	62.4	0.8 above.
Upper Mississippi valley	71.6	69.3	2.3 below.
Missouri valley	72.0	68.3	3.7 below.
Northern slope	63.0	61.9	1.1 below.
Middle slope	72.3	69.0	3.3 below.
Southern slope	75.4	76.6	0.2 above.
Southern plateau	78.0	78.9	0.9 above.
North Pacific	62.0	63.6	1.6 above.
Middle Pacific	68.7	70.9	2.2 above.
South Pacific	72.4	74.2	1.8 above.
Mount Washington, N. H.	43.4	46.6	3.2 above.
Pike's Peak, Colo.	33.3	31.3	2.0 below.
Salt Lake City, Utah	68.7	70.5	1.8 above.

The general distribution of mean temperature for June, and the districts of maximum departures from the normal in each year, beginning with 1873, are as follows:

Districts.	Maximum departures.	Year.	Remarks.
Northeastern Virginia	+ 4.5		
Northern New York	+ 1.7		
Lake Superior region	to 6.5	1873	
Ohio valley	+ 5.9		
Missouri valley	+ 4.0		
Middle Atlantic states	+ 3.1		
Pacific states	+ 2.0		
Upper Mississippi valley	+ 3.6		
Upper lakes	+ 2.4	1875	
Lower lakes	+ 0.6		
Gulf states	+ 0.6		
Middle Atlantic states	+ 3.0		
New England	+ 2.8		
Missouri valley	+ 3.1	1876	
Upper Mississippi valley	+ 2.9		
Upper Missouri valley	+ 4.5		
Minnesota	+ 3.1	1877	
Upper Mississippi valley	+ 2.4		
New England	+ 1.1		
Ohio valley	+ 4.3		
Middle Atlantic states	+ 4.0	1878	
Upper Missouri valley	+ 1.4		
Minnesota	+ 0.8		
Saint Lawrence valley	+ 3.7		
New England	+ 2.3	1879	
Southern slope	+ 2.4		
Northern plateau	+ 3.8		
North Pacific	+ 2.9	1880	
Upper lakes	+ 2.8		
Lower lakes	+ 2.0		
Lower lakes	+ 4.4		
New England	+ 4.3	1881	
Upper lakes	+ 4.1		
Middle slope	+ 5.1		
West Gulf states	+ 4.2		
Upper Mississippi valley	+ 2.1		
Upper lakes	+ 2.0	1882	
Southern plateau	+ 3.8		
Middle Pacific coast	+ 2.2		

The mean temperature of June, 1883, shows no marked deviations from the normal. On the Pacific coast, in New England, and the middle Atlantic states, it is from  $1^{\circ}.4$  to  $2^{\circ}.3$  above the normal. In the south Atlantic states, Florida, and the southern plateau, the departures above the normal temperature are less than  $1^{\circ}$ , and a normal condition is reported from the west Gulf states. In all other districts the mean temperature is below the normal. The districts of greatest deficiencies are the upper Mississippi and Missouri valleys, and middle slope, where they are  $2^{\circ}.3$ ,  $3^{\circ}.7$  and  $3^{\circ}.3$  respectively. In the northern slope and upper lake region, the deficiencies average about  $1^{\circ}$ ,

and in other districts where the temperature is below the normal the deficiencies are less than 1°. On the summit of Mount Washington, New Hampshire, the mean temperature is 3°.2 above the average of June, for the eleven preceding years; and on the summit of Pike's Peak, Colorado, it is 2° below the June average of nine preceding years.

The following are some of the extreme monthly mean temperatures reported from Signal-Service stations:

Stations reporting highest.	Stations reporting lowest.
Yuma, Arizona.....	87.3
Phoenix, Arizona.....	85.4
Key West, Florida.....	83.8
Brownsville, Texas.....	83.7
Galveston, Texas.....	83.6
El Paso, Texas.....	82.9
Indiana, Texas.....	82.1
Cedar Keys, Florida.....	82.1
Camp Thomas, Arizona.....	81.7
Pike's Peak, Colorado.....	51.3
Mount Washington, New Hampshire.....	46.6
Cape Mendocino, California.....	54.5
Marquette, Michigan.....	57.3
Eastport, Maine.....	57.5
Cheyenne, Wyoming.....	57.5
Alpena, Michigan.....	55.7
Mackinaw City, Michigan.....	48.9
Duluth, Minnesota.....	59.4
Escanaba, Michigan.....	59.4

Table of Comparative Maximum Temperatures for the Month of June.

State or Territory.	Maximum for June, 1883, Signal Service.		Maximum since Signal-Service stations were opened—3 to 12 years.		Highest from any other source.			
	Station.	Temp.	Station.	Temp.	Place.	Temp.	Year.	Length of Record.
Alabama.....	Mobile.....	99	Montgomery.....	106	Mount Vernon Barracks.....	102	1876	35 years.
Arizona.....	Phoenix.....	119	Maricopa Wells.....	116	Fort Mojave.....	119	1876	13 "
Do.....	Yuma.....	117	Yuma.....	114	Fort Lowell.....	116	1876	12 "
Arkansas.....	Fort Smith.....	100	Fort Smith.....	101	Fort Smith.....	99	1851	21 "
California.....	Red Bluff.....	104	Visalia.....	109	Fort Miller.....	121	1853	13 "
Do.....	Sacramento.....	102	Red Bluff.....	105	Fort Yuma.....	117	1859	31 "
Colorado.....	West Las Animas.....	98	Denver.....	99	Fort Lyon.....	107	1864	22 "
Connecticut.....	New Haven.....	87	New Haven.....	93	New Haven.....	102	1864	87 "
Dakota.....	Fort Buford.....	107	Fort Sully.....	111	Fort Sully.....	108	1861	16 "
Do.....	Bismarck.....	99	Fort Mead.....	103	Fort Buford.....	106	1868, 70	15 "
Delaware.....	Delaware Breakwater.....	85	Delaware Breakwater.....	89	Fort Delaware.....	97	1851	45 "
District of Columbia.....	Washington.....	92	Washington.....	102.5	Washington.....	99	1851	49 "
Florida.....	Sanford.....	98	Washington.....	100	Washington.....	106	1833	10 "
Do.....	Jacksonville.....	95	Jacksonville.....	98	Fort Barrancas.....	104	1854	57 "
Georgia.....	Savannah.....	97	Savannah.....	102	Fortsyth.....	104	1881	7 "
Idaho.....	Lewiston.....	98	Bolos City.....	96	Oglethorpe Barracks.....	102	1845	40 "
Illinois.....	Conecuh d'Alene.....	94	Fort Lapwai.....	97	Fort Boise.....	107	1876	15 "
Indiana.....	Cairo.....	91	Chicago.....	98	Fort Lapwai.....	105	1851	16 "
Indian Territory.....	Springfield.....	90	Cairo.....	93	Chicago.....	102	1851	38 "
Do.....	Indianapolis.....	89	Indianapolis.....	90	Rock Island Arsenal.....	102	1851	12 "
Iowa.....	Fort Supply.....	100	Fort Sill.....	105	Vevey.....	100	70, 73?	14 "
Kansas.....	Fort Reno.....	94	Fort Gibson.....	100	Fort Gibson.....	103	1855, 66	14 "
Do.....	Dubuque.....	94	Fort Gibson.....	105	Point Pleasant.....	101	1881	6 "
Louisiana.....	Leavenworth.....	92	Dodge City.....	102	Baton Rouge.....	98	1851	57 "
Do.....	Dodge City.....	97	Leavenworth.....	99	Baton Rouge.....	98	1851	53 "
Kentucky.....	Louisville.....	93	Louisville.....	100	Branswick.....	98	1836?	17 "
Louisiana.....	Shreveport.....	99	Shreveport.....	104	Hancock Barracks.....	98	1853	38 "
Maine.....	New Orleans.....	99	New Orleans.....	97	Fort Washington.....	105	1851	40 "
Do.....	Portland.....	86	Portland.....	94	Fort Independence.....	99	54, 72	47 "
Maryland.....	Eastport.....	79	Portland.....	81	Marquette.....	101	1862?	8 "
Massachusetts.....	Baltimore.....	90	Eastport.....	95	Monroe.....	101	1868?	10 "
Michigan.....	Boston.....	91	Baltimore.....	97.5	Saint Paul.....	99	1870	7 "
Do.....	Marquette.....	87	Boston.....	98	Brookhaven.....	100	1875	5 "
Minnesota.....	Detroit.....	87	Alpena.....	97	Fayette.....	99	1881	7 "
Mississippi.....	Saint Vincent.....	93	Detroit.....	94	Allenton.....	101	1881	4 "
Do.....	Vicksburg.....	95	Breckenridge.....	96	Saint Louis.....	100	1881	39 "
Missouri.....	Saint Louis.....	91	Vicksburg.....	101	Saint Louis.....	100	1881	10 "
Do.....	Terry's Landing.....	110	Saint Louis.....	99	Fort Benton.....	104	1876	13 "
Montana.....	Omaha.....	95	Fort Keogh.....	104	Fort McPherson.....	106	1876	13 "
Nebraska.....	North Platte.....	93	North Platte.....	101	Fort Lincoln.....	108	1881	1 "
Do.....	Winnebucca.....	88	Omaha.....	98	Weldon.....	106	1825	39 "
New Hampshire.....	Mount Washington.....	65	Winnebucca.....	95	Fort Johnson.....	103	1880	7 "
Do.....	Sandy Hook.....	98	Mount Washington.....	71	College Hill.....	99	57	57 "
New Jersey.....	Little Egg Harbor.....	89	Sandy Hook.....	97	Ruggles.....	100	1881	64 "
Do.....	Santa Fe.....	86	Sandy Hook.....	98	Fort Dallas.....	104	1879	7 "
New Mexico.....	Albany.....	88	Squan Beach.....	95	Carlisle Barracks.....	100	1868?	37 "
New York.....	Charlotte.....	94	La Mesilla.....	108	Mount Joy.....	100	1870	10 "
North Carolina.....	Wilmington.....	93	Oswego.....	98	Providence.....	97	1866?	35 "
Do.....	Cincinnati.....	90	Wilmington.....	100	Aiken.....	102	1881	4 "
Ohio.....	Columbus.....	89	Kittyhawk.....	99	Charleston.....	96	1851	105 "
Do.....	Portland.....	87	Cincinnati.....	96.5	Humboldt.....	104	71, 74	4 "
Oregon.....	Pittsburg.....	90	Cleveland.....	96	Fort Ringgold.....	114	1877	32 "
Pennsylvania.....	Philadelphia.....	90	Umatilla.....	103	Fort Duncan.....	112	1860	31 "
Do.....	Narragansett Pier.....	84	Pittsburg.....	98	Mount Carmel.....	107	1875	3 "
Rhode Island.....	Newport.....	84	Philadelphia.....	97	Fort Crittenden.....	103	1859	3 "
South Carolina.....	Charleston.....	99	Philadelphia.....	99	Lunenburg.....	95	1851	10 "
Do.....	Memphis.....	95	Charleston.....	100	Acotink.....	98	1881	7 "
Tennessee.....	El Paso.....	113	Memphis.....	108	Fortress Monroe.....	97	1881	56 "
Texas.....	Uvalde.....	104	El Paso.....	109	Fort Walla Walla.....	106	1876	12 "
Do.....	Salt Lake City.....	100	Salt Lake City.....	96	Weston.....	94	1875	2 "
Utah.....	Burlington.....	85	Burlington.....	94	Fort Howard.....	100	1870	30 "
Do.....	Norfolk.....	95	Cape Henry.....	98	Milwaukee.....	100	1870	11 "
Virginia.....	Lynchburg.....	98	Dayton.....	97	Fort Fred Steele.....	104	1871	15 "
Washington.....	Spokane Falls.....	55	Morganstown.....	93				
West Virginia.....	La Crosse.....	87	La Crosse.....	98				
Wisconsin.....	Milwaukee.....	80	Milwaukee.....	94				
Do.....	Cheyenne.....	91	Cheyenne.....	97				

#### DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the table of average temperatures for June, 1883. Voluntary observers report the following notes in connection with this subject:

*California.*—Poway, San Diego county: mean temperature, 69°.3, is 4°.2 above the June average of five years.

*Illinois.*—Anna, Union county: mean temperature, 74°.2, is 0°.7 above the June average of eight years.

*Riley, McHenry county:* mean temperature, 65°.1, is 1°.5 below the June average of the last twenty-two years.

*Indiana.*—Wabash, Wabash county: mean temperature, 68°.9, is 0°.2 above the June average of the last seven years. The mean temperature for the six months ending June 30, 1883, is 44°.17 or 1°.33 below the average of the corresponding months of the last seven years.

*Logansport, Cass county:* mean temperature, 71°.1, is 4° below the June average of twenty-four years. The June ex-

Table of Maximum and Minimum Temperatures for June, 1883.

State or Territory.	Signal Service.		U. S. Army Post Surgeons, or Voluntary Observers.			
	Station.	Max.	Min.	Station.	Max.	Min.
Alabama .....	Mobile .....	99	70	State Line .....	104	60
Do .....	Montgomery .....	97	63	Tuscaloosa .....	97	50
Arizona .....	Phoenix .....	119	55	Texas Hill .....	118	76
Do .....	Fort Apache .....	101	38	Brinkley .....	99	46
Arkansas .....	Fort Smith .....	100	58	Lead Hill .....	99	51
Do .....	Little Rock .....	97	57	White Water .....	118	60
California .....	Red Bluff .....	104	54	Ione .....	109	40
Do .....	Cape Mendocino .....	83	43	Fort Lyon .....	100	41
Colorado .....	West Las Animas .....	96	30	Fort Lewis .....	98	25
Do .....	Pike's Peak .....	53	13	Southington .....	94	51
Connecticut .....	New Haven .....	87	46	Fort Yates .....	108	33
Dakota .....	Fort Buford .....	107	30	Fort Pembina .....	91	29
Do .....	Bismarck .....	99	33	West Washington .....	93	49
Delaware .....	Del. Breakwater .....	85	56	Live Oak .....	99	62
District of Columbia .....	Washington .....	92	51	Limona .....	96	61
Florida .....	Sanford .....	98	71	Gainesville .....	96	48
Do .....	Jacksonville .....	95	68	Way Cross .....	104	60
Georgia .....	Savannah .....	97	65			
Do .....	Atlanta .....	91	56			
Idaho .....	Lewiston .....	98	44			
Do .....	Eagle Rock .....	78	34			
Illinois .....	Cairo .....	91	57			
Do .....	Chicago .....	84	48			
Indiana .....	Indianapolis .....	89	50			
Indian Territory .....	Fort Supply .....	100	45			
Iowa .....	Dubuque .....	94	50			
Do .....	Davenport .....	92	49			
Kansas .....	Leavenworth .....	93	47			
Do .....						
Kentucky .....	Louisville .....	93	52			
Louisiana .....	Shreveport .....	99	64			
Do .....	New Orleans .....	92	68			
Maine .....	Portland .....	86	51			
Do .....	Eastport .....	79	44			
Maryland .....	Baltimore .....	90	55			
Do .....	Ocean City .....	89	55			
Massachusetts .....	Boston .....	91	51			
Do .....	Provincetown .....	87	50			
Michigan .....	Marquette .....	87	40			
Do .....	Alpena .....	80	34			
Minnesota .....	Saint Vincent .....	93	29			
Mississippi .....	Vicksburg .....	95	64			
Do .....	Starkville .....	90	58			
Missouri .....	Saint Louis .....	91	53			
Do .....						
Montana .....	Terry's Landing .....	110	32			
Do .....	Glendive .....	110	43			
Do .....	Deer Lodge .....	103	39			
Nebraska .....	Omaha .....	95	45			
Do .....	North Platte .....	93	46			
Nevada .....	Winnebemucca .....	88	39			
Do .....	Pioche .....	86	37			
New Hampshire .....	Mount Washington .....	63	21			
New Jersey .....	Sandy Hook .....	90	59			
Do .....	Little Egg Harbor .....	89	51			
New Mexico .....	Santa Fe .....	86	38			
Do .....						
New York .....	Albany .....	88	52			
Do .....	Oswego .....	86	44			
North Carolina .....	Charlotte .....	94	60			
Do .....	New River Inlet .....	89	60			
Ohio .....	Cincinnati .....	90	57			
Do .....	Cleveland .....	86	44			
Oregon .....	Portland .....	87	44			
Do .....	Roseburg .....	87	42			
Pennsylvania .....	Pittsburg .....	99	48			
Do .....	Philadelphia .....	99	52			
Rhode Island .....	Narragansett Pier .....	84	50			
South Carolina .....	Charleston .....	99	65			
Do .....						
Tennessee .....	Memphis .....	95	57			
Do .....	Knoxville .....	99	54			
Do .....	Chattanooga .....	93	56			
Texas .....	El Paso .....	113	56			
Do .....	Fort Elliott .....	90	48			
Utah .....	Salt Lake City .....	100	47			
Vermont .....	Burlington .....	85	46			
Virginia .....	Norfolk .....	95	58			
Do .....	Lynchburg .....	94	55			
Washington .....	Spokane Falls .....	95	39			
Do .....	Colfax .....	87	35			
West Virginia .....	La Crosse .....	87	59			
Wisconsin .....	Milwaukee .....	80	43			
Do .....	Cheyenne .....	91	34			
Wyoming .....	Fort Washakie .....	78	34			

tremes for that period are: maximum, 106° in 1872; minimum, 44° in 1869.

Vevay, Switzerland county: mean temperature, 73°.1 is about 2° below the June normal.

Kansas.—Lawrence, Douglas county: mean temperature, 71°.4, is 2°.9 below the June average of the last fifteen years. The extremes for June, 1883, are: maximum, 94°; minimum, 48°.5. The June extremes for the last fifteen years are: maximum, 102°, in 1870; minimum, 37, in 1869.

Yates Centre, Woodson county: mean temperature, 71°.3, is 3°.1 below the June average of the last three years.

Wellington, Sumner county: mean temperature, 71°.3, is 3°.7 below the June average of the last four years.

Maine.—Gardiner, Kennebec county: mean temperature, 64°.1, is 0°.7 below the June average of the last forty-seven years.

Maryland.—Fallston, Harford county: mean temperature, 70°.9, is 0.3 above the June average of the last twelve years.

Missouri.—See report of Professor Nipher, Director of the "Missouri Weather Service," under "Notes and Extracts."

New York.—North Volney, Oswego county: mean temperature, 65°.9, is 1° above the June average of the last fifteen years.

Palermo, Oswego county: mean temperature, 65°.2, is 0°.6 below the June average of the last thirty years. The extremes of June, 1883, are: maximum 82°; minimum 47°. The June extremes for the last thirty years are: maximum 95°, in 1864; minimum 39°, in 1859.

Ohio.—Wauseon, Fulton county: mean temperature, 66°.5, is 2° below the June average of the last thirteen years. During that period the highest June mean, 72°.4, occurred in 1873; the lowest, 65°.5, occurred in 1881. The June extremes of the same period are: maximum 99°, in 1874; minimum 34°.5, in 1883.

Pennsylvania.—Dyberry, Wayne county: mean temperature, 65°.0, is 0°.2 above the June average of the last seventeen years. During that period the highest June mean, 65°.4, occurred in 1870; the lowest, 60°.4, occurred in 1881. The June extremes of June, 1883, are: maximum 86°; minimum 34°; and the June extremes for the last seventeen years are: maximum 96°, in 1870; minimum 28°, in 1875.

Texas.—New Ulm, Austin county: mean temperature, 80°.7, is about the June normal of the last eleven years.

Vermont.—Woodstock, Windsor county: mean temperature, 67°.4, is 3°.7 above the average of the last sixteen years. The highest June mean of that period, 69°.1, occurred in 1876; the lowest, 58°.8, occurred in 1869. The June extremes for the same period are: maximum 95°.3, in 1878; minimum 31°.4, in 1881.

Virginia.—Variety Mills, Nelson county: mean temperature, 71°.8, is 0°.6 above the average of the last six years.

West Virginia.—Helvetia, Randolph county: mean temperature, 68°.8, is 2°.9 above the June average of the last eleven years.

#### MONTHLY RANGES OF TEMPERATURE.

The monthly ranges of temperature have been greatest in Dakota and Montana, and smallest on the Gulf coast. The largest monthly ranges are as follows: Terry's Landing, Montana, 78°; Cartersville, Montana, 73°; Deer Lodge, Montana, 73°; Fort Yates, Dakota, 73°; Fort Assinaboine, Montana, 70°; Fort Lapwai, Idaho, 67°; Wickenburg, Arizona, 66°; Bismarck, Dakota, 66°; New Chicago, Montana, 65°; Phoenix, Arizona, 64°; Saint Vincent, Minnesota, 64°; Fort Apache, Arizona, 63°; Fort Benton, Montana, 61°; Fort Bennett, Dakota, 60°; Fort Verde, Arizona, 60°; Huron, Dakota, 60°. The smallest are: Cedar Keys, Florida, 20°; Key West, Florida, 20°; Sanford, Florida, 20°; Pensacola, Florida, 21°; Fort Macon, North Carolina, 22°; Galveston, Texas, 22°; Portsmouth, North Carolina, 22°; New Orleans, Louisiana, 23°; Brownsville, Texas, 25°; Block Island, Rhode Island, 26°; Cape May, New Jersey, 26°; Indianola, Texas, 26°; Fort Smith, Arkansas, 27°; Point Judith, Rhode Island, 27°; Jacksonville, Florida, 27°; San Diego, California, 28°; Delaware Breakwater, Delaware, 29°; Mobile, Alabama, 29°; New River Inlet, North Carolina, 29°; Barnegat, New Jersey, 30°; Chincoteague, Virginia, 30°.

The greatest daily ranges of temperature have varied in the various districts as follows:

New England.—From 18° at Block Island, Rhode Island, on the 8th and 15th, to 31° at Eastport, Maine, on the 8th.

*Middle Atlantic states.*—From  $16^{\circ}$  at Cape May, New Jersey, on the 2d, to  $32^{\circ}$  at Williamsport, Pennsylvania, on the 14th.

*South Atlantic states.*—From  $16^{\circ}$  at Portsmouth, North Carolina, on the 17th and 18th, to  $26^{\circ}$  at Atlanta, Georgia, on the 1st.

*Florida peninsula.*—From  $16^{\circ}$  at Key West on the 22d, to  $27^{\circ}$  at Sanford on the 21st.

*Eastern Gulf.*—From  $15^{\circ}$  at Pensacola, Florida, on the 21st, to  $27^{\circ}$  at Mobile, Alabama, on the 22d.

*Western Gulf.*—From  $14^{\circ}$  at Galveston, Texas, on the 3d, to  $34^{\circ}$  at Fort Smith, Arkansas, on the 11th.

*Ohio valley and Tennessee.*—From  $24^{\circ}$  at Cincinnati, Ohio, on the 2d, to  $32^{\circ}$  at Louisville, Kentucky, on the 2d.

*Lower lakes.*—From  $26^{\circ}$  at Toledo, Ohio, on the 2d, to  $37^{\circ}$  at Oswego, New York, on the 2d.

*Upper lakes.*—From  $22^{\circ}$  at Chicago, Illinois, on the 5th, to  $34^{\circ}$  at Marquette, Michigan, on the 8th.

*Extreme northwest.*—From  $32^{\circ}$  at Bismarck, Dakota, on the 13th and 14th, to  $43^{\circ}$  at Fort Buford, Dakota, on the 30th.

*Upper Mississippi valley.*—From  $24^{\circ}$  at Cairo, Illinois, on the 21st, to  $32^{\circ}$  at Saint Paul, Minnesota, on the 1st.

*Missouri valley.*—From  $27^{\circ}$  at Omaha, Nebraska, on the 15th, to  $40^{\circ}$  at Fort Bennett, Dakota, on the 13th.

*Northern slope.*—From  $31^{\circ}$  at North Platte, Nebraska, on the 14th, to  $43^{\circ}$  at Fort Shaw, Montana, on the 25th and 26th;  $43^{\circ}$  at Billings, Montana, on the 24th; and  $43^{\circ}$  at Fort Washakie, Wyoming, on the 4th.

*Middle slope.*—From  $22^{\circ}$  on the summit of Pike's Peak, Colorado, on the 4th, to  $40^{\circ}$  at West Las Animas, Colorado, on the 26th.

*Southern slope.*—From  $33^{\circ}$  at Fort Concho, Texas, on the 11th, to  $34^{\circ}$  at Coleman City, on the 8th and 18th.

*Southern plateau.*—From  $33^{\circ}$  at Fort Grant, Arizona, on the 14th, to  $54^{\circ}$  at Fort Apache, Arizona, on the 18th.

*Middle plateau.*—From  $35^{\circ}$  at Pioche, Nevada, on the 9th, and at Salt Lake City, Utah, on the 26th, to  $39^{\circ}$  at Winnemucca, Nevada, on the 10th.

*Northern plateau.*—From  $39^{\circ}$  at Fort Missoula, Montana, on the 13th, to  $40^{\circ}$  at Lewiston, Idaho, on the 24th, and at Spokane Falls, Washington Territory, on the 38th.

*North Pacific.*—From  $33^{\circ}$  at Portland, Oregon, on the 18th, to  $36^{\circ}$  at Roseburg, Oregon, on the 18th.

*Middle Pacific.*—From  $27^{\circ}$  at Cape Mendicino, California, on the 9th, to  $36^{\circ}$  at Sacramento, California, on the 28th and 29th.

*South Pacific.*—From  $27^{\circ}$  at San Diego, California on the 4th, to  $44^{\circ}$  at Los Angeles, California, on the 25th.

#### FROSTS.

Frosts occurred in the various states and territories, as follows:

*Colorado.*—Denver, 13th; on the summit of Pikes Peak, 1st, 7th, 8th, 9th.

*Dakota.*—Bismarck 2d; Fort Buford, 2d; Tobacco Garden, 2d.

*Illinois.*—Chicago, 14th.

*Indiana.*—Lafayette, 14th; Logansport, 14th, 15th.

*Iowa.*—Dubuque, 14th.

*Massachusetts.*—Westborough, 4th.

*Michigan.*—Alpena, 1st; East Tawas, 1st; Grand Haven, 1st, 14th; Ione, 1st; Kalamazoo, 1st; Lansing, 13th; Litchfield, 2d; Port Huron, 14th; Swartz Creek, 1st.

*Minnesota.*—Moorhead, 23d; Saint Vincent, 23d.

*Montana.*—Fort Ellis, 12th; Fort Assiniboine, 1st; New Chicago, 12th.

*Nevada.*—Carson City, 15th.

*New Hampshire.*—On the summit of Mount Washington, 1st, 2d, 3d, 14th, 15th, 24th, 26th, 30th.

*New Mexico.*—Santa Fé, 9th.

*New York.*—Albany, 1st: Frost this morning on the lowlands in this vicinity caused considerable damage to plants. Factoryville, 2d; Kiantone, 22d.

*Ohio.*—College Hill, 1st; Ruggles, 1st; Toledo, 1st; Waukon, 1st, 14th.

*Pennsylvania.*—Blooming Grove, 2d; Dyberry, 2d, Wellsboro', 1st, 2d.

*Vermont.*—Woodstock, 2d.

*Virginia.*—Marion, 1st.

*Wyoming.*—Cheyenne, 9th, 13th; Fort Washakie, 1st, 3d, 4th.

#### ICE.

The following instances of ice formation have been reported: Swartz creek, Michigan, 13th; Tobacco Garden, Dakota, 2d, one-fourth inch in thickness.

#### PRECIPITATION.

[Expressed in inches.]

The distribution of rainfall over the United States and Canada, for the month of June, 1883, as determined from reports from more than six hundred stations, is exhibited on chart iv.

The general distribution of rainfall during the month of June, and the districts of maximum departures from the June normal of each year since 1874, are as follows:

Districts.	Maximum departures.	Year.	Remarks.
Minnesota.....	+ 4.50		
East Gulf.....	+ 1.15		
Ohio valley.....	- 1.00	1874...	Deficient in the Ohio and Missouri valleys, middle and south Atlantic states, and lower lake region; excessive in the Saint Lawrence valley, New England, Gulf states, upper Mississippi valley, upper lake region, Minnesota, and on the Pacific coast.
Missouri valley.....	+ 5.03		Deficient in the Saint Lawrence valley, upper lakes, middle Atlantic and Gulf states; excessive in New England, lower lakes, Ohio, upper Mississippi, and Missouri valleys, and on the Pacific coast. At Omaha, Nebraska, 5.02 inches fell in eight hours on the 17th.
Upper Mississippi valley.....	+ 2.25		
East Gulf.....	+ 3.20	1875...	Excessive on the Pacific coast, in all districts east of the Mississippi river except in the lower lake region and in New England; deficient in Minnesota, Missouri valley, and west Gulf states.
West Gulf.....	- 1.65		
South Atlantic states.....	+ 4.80		Small deficiencies in the Gulf states, Saint Lawrence valley, and in California; above the average in all other districts, the excesses being very large from the Missouri valley to the Atlantic coast.
Upper lakes.....	+ 1.35		Excessive along the Atlantic and Gulfs, in the upper Missouri valley, and upper lake region; deficient on the Pacific coast, in the lower lake region, Tennessee, lower Missouri, upper Mississippi, and Ohio valleys; normal in Minnesota.
Minnesota.....	+ 1.95	1876...	Excessive in the Missouri valley, lower lake region, New England, and Saint Lawrence valley; deficient in all other districts, except slightly above the average in the middle Atlantic states.
Upper Missouri valley.....	+ 1.50		
New England.....	+ 1.10		
Tennessee.....	+ 5.00		Excessive in Minnesota, lake region, Ohio valley, west Gulf states, and north Pacific coast region; deficient in the east Gulf states, along the Atlantic coast, in the Missouri valley, and in California; normal in the upper Mississippi valley.
South Atlantic states.....	+ 4.90	1877...	Deficient in the Southern states, lower Missouri valley, Minnesota, and upper lake region; excessive in the upper Missouri and upper Mississippi valleys, lower lake region, New England, middle Atlantic states, northern and middle Pacific coast regions; normal in the Ohio valley and southern California.
Missouri valley.....	+ 3.30		
Saint Lawrence valley.....	+ 0.30		
West Gulf.....	+ 2.14		Deficient in Tennessee, in all the states bordering on the Atlantic ocean and Gulf of Mexico, except Florida; also deficient in the middle and south Pacific coast regions; excessive over the interior districts and Florida.
East Gulf.....	+ 1.52	1878...	
Portland, Oregon.....	+ 2.14		
Tennessee.....	+ 2.79		
South Atlantic states.....	- 1.68		
East Gulf.....	+ 1.55		
Saint Lawrence valley.....	+ 2.26	1879...	
New England.....	+ 1.48		
Lower Missouri valley.....	+ 1.30		
Lower Mississippi valley.....	+ 3.02		
South Atlantic states.....	+ 2.78		
New England.....	+ 2.01		
Minnesota.....	+ 2.40	1880...	
West Gulf.....	+ 1.52		
Upper lakes.....	+ 1.49		
West Gulf.....	- 3.06		
South Atlantic states.....	+ 2.40		
New England.....	+ 1.75	1881...	
Middle Atlantic states.....	+ 1.43		
East Gulf.....	+ 1.40		
West Gulf.....	- 1.90		
East Gulf.....	- 1.53		
Middle Atlantic states.....	- 1.01		
Upper Mississippi valley.....	+ 1.90	1882...	
Upper lake region.....	+ 1.39		
Missouri valley.....	+ 1.35		

In New England, Florida, the Ohio valley, Tennessee, extreme northwest, southern slope, and west of the Rocky mountains, the rainfall is below the June average. The most marked deficiencies occur in the extreme northwest, southern slope, and north Pacific coast region, where they are 1.60, 1.56, and 1.46, respectively. In the middle and south Atlantic states, Gulf states, lake region, upper Mississippi valley, northern and middle slopes, the rainfall is above the average. Large excesses are reported from the Missouri valley, and middle and south Atlantic states. The heaviest precipitation of the month occurred in the Missouri valley. At Omaha, the monthly rain-

fall was 10.84, or an excess of 4.22 over the average of June for eleven years at that station. Voluntary observers in southeastern Nebraska and northwestern Missouri, report monthly rainfalls of from 10.00 to 17.00.

In the first column of the following table is given the average rainfall for June in the various districts for several years; in the second column is given the average for June, 1883; and the third column shows the excess or deficiency of June, 1883, as compared with the average of previous years:

Average precipitation for June, 1883.

Districts.	Average for June. Signal-Service observa- tions.		Comparison of June, 1883, with the average for several years.
	For several years.	For 1883.	
New England.....	3.60	3.36	0.24 deficiency.
Middle Atlantic states.....	3.52	5.23	1.70 excess.
South Atlantic states.....	4.57	6.49	1.92 excess.
Florida peninsula.....	5.70	4.80	0.90 deficiency.
East Gulf.....	4.29	4.91	0.62 excess.
West Gulf.....	3.37	3.73	0.36 excess.
Tennessee.....	4.34	3.49	0.85 deficiency.
Ohio valley.....	4.64	4.21	0.43 deficiency.
Lower lakes.....	3.26	4.04	0.78 excess.
Upper lakes.....	4.47	5.38	0.91 excess.
Extreme northwest.....	4.10	2.50	1.60 deficiency.
Upper Mississippi valley.....	5.83	5.98	0.16 excess.
Missouri valley.....	5.06	7.98	2.92 excess.
Northern slope.....	2.53	3.43	0.90 excess.
Middle slope.....	2.01	2.27	0.26 excess.
Southern slope.....	3.26	1.70	1.56 deficiency.
Southern plateau.....	0.40	0.03	0.37 deficiency.
North Pacific coast.....	1.50	0.04	1.46 deficiency.
Middle Pacific coast.....	0.18	0.00	0.18 deficiency.
South Pacific coast.....	0.02	0.04	0.02 excess.
Mount Washington, N. H.....	8.53	11.30	2.77 excess.
Pike's Peak, Col.....	1.94	1.76	0.18 deficiency.
Salt Lake City, Utah.....	0.75	0.33	0.42 deficiency.

## DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the table of average precipitation for June, 1883. Voluntary observers report the following notes in connection with this subject:

**Illinois.**—Anna, Union county: monthly rainfall, 8.21, is 2.80 above the June average of the last eight years.

Riley, McHenry county: monthly rainfall, 3.92, is 0.19 below the June average of the last twenty-two years.

**Indiana.**—Wabash, Wabash county: monthly rainfall, 4.86, is 0.03 below the June average of the last seven years. The total rainfall for the six months ending June 30, 1883, is 27.58, or 7.30 above the average of the corresponding months of the last seven years.

Vevay, Switzerland county: monthly rainfall, 4.17, is 0.80 below the June average at this place.

Logansport, Cass county: monthly rainfall, 5.60, is 1.78 above the June average of the last twenty-four years.

**Kansas.**—Lawrence, Douglas county: monthly rainfall, 7.73, is 2.80 above the June average of the last fifteen years. During that period the largest June rainfall, 12.11, occurred in 1876; the smallest, 1.30, occurred in 1870.

Yates Centre, Woodson county: monthly rainfall, 5.19, is 0.10 below the June average of the last three years.

Wellington, Sumner county: monthly rainfall, 5.34, is 1.14 above the June average of the four preceding years.

**Maine.**—Gardiner, Kennebec county: monthly rainfall, 4.87, is 1.60 above the June average of the last forty-seven years.

**Maryland.**—Fallston, Harford county: monthly rainfall, 10.21, is 6.58 above the June average of the last twelve years, and is the largest June rainfall of that period; the smallest, 1.05 occurred in 1873.

**Missouri.**—See report of Professor Nipher, Director of the "Missouri Weather Service," under "notes and extracts."

**New Hampshire.**—Antrim, Hillsborough county: monthly rainfall, 2.65, is 1.44 below the June average of the last ten years.

**New York.**—North Volney, Oswego county: monthly rainfall, 4.55, is 1.25 above the June average of the last eleven

years. The largest June rainfall of that period, 5.55, occurred in 1874; the smallest, 2.00, occurred in 1873.

**Palermo, Oswego county:** monthly rainfall, 4.21, is 0.84 above the June average of the last thirty years. The largest June rainfall of that period, 8.80, occurred in 1865; the smallest, 0.70, occurred in 1864 and 1870.

**Ohio.**—Wauseon, Fulton county: monthly rainfall, 4.73, is 0.10 above the June average of the last eleven years. The largest June rainfall of that period, 8.43, occurred in 1881; the smallest, 1.43, occurred in 1872.

**Pennsylvania.**—Dyberry, Wayne county: monthly rainfall, 5.38, is 2.20 above the June average of the last twelve years, and is the largest June rainfall of that period; the smallest, 1.13, occurred in 1873.

**Vermont.**—Woodstock, Windsor county: monthly rainfall, 5.03, is 0.54 below the June average of the last sixteen years.

**Virginia.**—Variety Mills, Nelson county: monthly rainfall, 5.74, is 3.46 above the June average of the last five years, and is the largest June rainfall of that period; the smallest, 1.46, occurred in 1880.

**West Virginia.**—Helvetia, Randolph county: monthly rainfall, 6.55, is 0.56 above the June average of the last seven years.

## HAIL.

Hailstorms occurred in the various states during the month, as follows:

**Colorado.**—Fort Collins, Larimer county: A severe hailstorm occurred in this vicinity on the 16th, totally destroying many fields of growing grain. Much damage was done by lightning during the storm.

**Illinois.**—Centralia, Marion county: Much damage was done to the growing crops west of this place by the hailstorm of the 15th. Some of the hailstones measured two inches in diameter.

**Iowa.**—Essex, Page county: This place was visited by a violent hailstorm on the evening of the 26th. The storm lasted for about thirty minutes, during which nearly all the window-glass in the village was broken. The hailstones accumulated to depths of from four to five feet on the windward sides of buildings. Farmers from surrounding localities report that the growing crop was entirely destroyed and that fields of grain were badly beaten down.

**Kansas.**—Centralia, Nemaha county: a severe hail-storm occurred at this place on the morning of the 12th, causing injury to stock.

**Medicine Lodge, Barbour county:** during the night of the 18-19th, the severest hail-storm ever known in this section, occurred near the boundary line of Indian Territory. Reports state that many young calves were killed by the hailstones. The storm pursued a northeasterly course.

**Montana.**—Fort Benton: a heavy rain and hail-storm occurred at this place at 5.30 p. m. of the 17th, causing injury to the grain crop in this vicinity. Some of the hailstones measured one and one-half inches in diameter.

**Nebraska.**—Clear Creek, Saunders county: a heavy hail-storm occurred at this place on the 20th, the hailstones measuring from one and one-half to one and three-fourths inches in diameter.

**Pennsylvania.**—Pittsburg: on the evening of the 18th, a severe wind and hail-storm occurred at this place. The hailstones were very large and caused damage to sky-lights and windows. Reports from the southwestern counties state that the storm was very severe, and that barns were unroofed, trees uprooted, and cattle killed. Serious damage was done to railroads by washouts and landslides.

**Texas.**—Fort Davis: a thunder-storm, accompanied by heavy rain and hail, prevailed at this place from 12.50 to 1.35 p. m., of the 3d, causing much damage to crops.

**Utah.**—Fillmore City: a violent hail storm occurred at this place on the 16th. The hailstones were of unusual size, and fell with great force, stripping the trees of their foliage, beating down fields of grain, and breaking much window-glass. The ground was covered with hailstones a depth of three inches.

*Table of Excessive, Greatest, and Least Monthly Rainfalls.*

Station.	Specially heavy.			Largest monthly.	Smallest monthly.
	Date.	Amt.	Duration.		
Alabama.					Arizona.
Mount Vernon Barracks.	7	3.01		14.34	Fort Thomas.
Do.	10	2.99			Maricopa.
Do.	22	2.30			Phoenix.
Greenville.				10.28	San Carlos.
Mobile.	22, 23	2.32		9.43	San Simon.
Demopolis				7.00	Texas Hill.
State Line				6.53	Tama.
Auburn				6.22	Wickenburg.
Arkansas.					Casa Grande.
Lead Hill.	8, 9	3.17		6.24	Ft Apache.
Dakota.					Willcox.
Deadwood.	23, 24	3.41		5.26	Fort Verde.
Huron.	17	2.10			Prescott.
<i>District of Columbia.</i>					Benson.
Washington.					Pantano.
West Washington				8.55	California.
Distributing Reservoir.				7.78	Alta.
Florida.				6.14	Anaheim.
Pensacola.	10	2.50		9.36	Antioch.
Sanford.	15	2.04		8.57	Auburn.
Jacksonville.				7.05	Borden.
Live Oak.				7.90	Brentwood.
Saint Augustine.				6.73	Brighton.
Waldo.				6.24	Byron.
Punta Rassa	15	2.88			Caliente.
Georgia.					Calistoga.
Quitman.				10.50	Chico.
Jesus.				8.72	Chuaral.
Milien.				7.12	Cisco.
Fort Gaines.				6.31	Colfax.
Macon.				6.07	Colton.
Forsyth.	7	2.30			Davis.
Illinois.					Delano.
McLeansboro.				9.13	Dunnigan.
Griggsville.				8.80	Emigrant Gap.
Centralia.				8.47	Farmington.
Springfield.	8	2.70		8.40	Fresno.
Do.	20, 21	2.34			Galt.
Anna.					Gilroy.
Mascoutah.				8.21	Goschen.
Monmouth.				6.70	Hollister.
Collinsville.				6.55	Indio.
Swanwick.				6.48	Ione.
Golconda.				6.38	Keen.
Cairo	9, 10	2.95		6.15	Kingsbury.
Atlanta.	8	2.50		6.11	Knight's Landing.
Indiana Territory.					Lemoore.
Fort Reno.				8.00	Livermore.
Indiana.					Mammoth Tank.
La Porte.				9.26	Martinez.
Bluffton.				7.78	Marysville.
Vincennes.				7.13	Menlo Park.
Greenfield.	24	3.02		6.97	Merced.
Princeton.				6.60	Modesto.
Iowa.					Majave.
Indianola.				9.19	Newhall.
Fort Madison.	20	2.00		8.55	Niles.
Logan.	3	2.60		8.50	Oakland.
Des Moines.	17	2.94		7.75	Oakwood.
Humboldt.	17	2.17			Petaluma.
Kansas.					Pleasanton.
Fort Leavenworth.				12.16	Poway.
Manhattan.	23	2.32		9.58	Princeton.
Holton.				9.12	Ravenna.
Clay Centre.	1, 2	2.01		8.29	Red Bluff.
Do.	24	3.05	4 hours		Rocklin.
Lawrence.	II, 13	2.98	6 hours	7.73	Sacramento.
Topeka.				7.05	Salinas City.
Milan.				7.00	San Fernando.
Pretty Prairie.	5, 6	3.75		6.81	San Jose.
Elk Falls.	6	2.00		6.75	San Mateo.
Do.	8	2.50			Solidad.
Levy.				6.73	South Vallejo.
Salina.	8	2.01		6.11	Spadra.
Kentucky.					Summit.
Frankfort.				6.40	Sumner.
Louisiana.					Tehama.
New Orleans.	8, 9	3.35		12.05	Tehachapi.
Franklin.				10.22	Tennant.
Whiteville.				9.90	Tracy.
Point Pleasant.	27, 28	5.62		8.40	Tulare.
Terre Bonne.				7.03	Turlock.
Shreveport.	5	2.20			White Water.
Maine.					Woodland.
Eastport.	20, 21	2.77			Angel Island.
Maryland.					F'd San Francisco.
Fallston.					Cape Mendocino.
Baltimore.	26, 27, 28	3.28		10.21	Santa Cruz.
McDonough.	26, 27	2.57		8.08	Orland.
Fort McHenry.				7.49	Los Angeles.
Woodstock.	26, 27	3.15		6.45	Pajaro.
Sandy Spring.	25, 26, 27	2.37		6.28	San Diego.
Cumberland.	25	2.15			Montery.
Michigan.					Suisun.
Battle Creek.	5	2.75		16.24	Connecticut.
Do.	8, 9	2.25			Southington.
Do.	25	4.75			Idaho.
Do.	26, 27	3.00			Lewiston.
Do.	28	3.14			Fort Lapwai.
Litchfield.	25, 26, 27	7.00		10.85	Montana.
Lansing.				9.91	Fort Assiniboine.
Grand Haven.				9.24	New Mexico.
Coldwater.				9.16	Fort Bayard.
Thornville.				9.14	Fort Wingate.
Ionia.				8.40	Deming.

*Table of Excessive, Greatest, and Least Monthly Rainfalls.—Continued.*

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration.		Station.	Am.
Michigan—Continued.					New Mexico.—Cont'd.	
Mondon.	25	2.35		7.38	Fort Union.	0.1
Do.	27	2.35		6.95	Nevada.	
East Tawas.					Bowwave.	0.0
Minnesosa.					Boca.	0.0
Saint Paul.					Carlin.	0.0
Minneapolis.	17	2.32		6.59	Elko.	0.0
Mississippi.					Hot Springs.	0.0
Pass Christian.					Otogo.	0.0
Scranton.					Reno.	0.0
Lake.					Tecoma.	0.0
Brookhaven.					Truckee.	0.0
Missouri.					Wadsworth.	0.0
Phelps City.					Wells.	0.0
Oregon.					Brown's.	0.0
Bedford.	16	3.35		11.65	Carson City.	0.1
Miami.					Paislade.	0.1
Lexington.					Humboldt.	0.2
Louisiana.					Battle Mountain.	0.2
Hannibal.					Fort McDermitt.	0.2
Macon.					Golconda.	0.4
Savannah.					Oregon.	
Pleasant Hill.					Roseburg.	0.0
Curryville.	16	3.42		8.13	Eola.	0.0
Sedalia.					Portland.	0.0
Ironton.					Albany.	0.2
Mexico.					Texas.	
Centreville.					El Paso.	0.0
Bolivar.					Utah.	
Sheibina.					Blue Creek.	0.0
Nebraska.					Kelton.	0.0
Table Rock.	3	3.35		17.02	Promontory.	0.0
Do.	11	2.50			Ogden.	0.0
Do.	15	3.12			Nephil.	0.1
Do.	17	4.75			Terrace.	0.2
Do.	23	2.25			Corriane.	0.3
Do.	24	2.19			Salt Lake City.	0.3
Nebraska City.	1, 2	2.04		16.37	Washington.	
Do.	15	2.22			Fort Canby.	0.0
Do.	17	2.95			Fort Spokane.	0.0
Do.	23, 25	2.54			Bainbridge Island.	0.1
Johnson.	15	2.00		16.20	Fort Townsend.	0.3
Do.	17	4.50			Wyoming.	
Do.	23	3.60			Fort Bridger.	0.0
Pern.	15	2.35				
Do.	16, 17	4.75				
Stella.	1, 2	2.23		13.26		
Do.	15	2.00				
Do.	17	2.85				
Omaha.	1, 2	3.51		10.84		
Do.	22, 23	2.89				
Stockham.	15	2.80		10.30		
Clear Creek.				8.50		
North Platte.	3, 4	2.96		7.49		
Do.	16, 17	2.35				
Fremont.				6.18		
New Brunswick.						
Chatham.				6.00		
New Hampshire.						
Mount Washington.	11, 12, 13	4.88		11.30		
Do.	20	2.30				
Woodstock.	17, 18, 19	5.00		7.43		
Ashland.	19	2.14		6.38		
New Jersey.						
Bordentown.	19	5.81		8.48		
Caldwell.	28	2.00		7.12		
Freehold.	19	2.01		6.91		
Do.	27	2.25				
South Orange.	26, 27	2.30				
Paterson.	27, 28	2.16				
Newark.	27	2.00				
New York.						
Factoryville.				7.31		
Penn Yan.				6.90		
Albany.				6.30		
Hector.	5, 6	2.95	7 hours	6.10		
Do.	2	2.30				
Do.	26, 27	2.00				
Mountainville.	27, 28	2.01				
North Carolina.						
Salisbury.						
Portsmouth.	2	5.20		11.99		
Fort Macon.	2, 3	5.66		11.09		
Wilmington.	2	5.22	8 hours	10.89		
Sloop Point.	2	3.42		10.84		
Highlands.	12, 13	3.00		9.71		
Smithville.	2	2.76		7.60		
Weidon.				6.95		
Kittyhawk.				6.73		
New River Inlet.	2	2.40		6.57		
Brevard.				6.37		
Ohio.				6.29		
Lebanon.						
Warren.				7.28		
Wyandot.				7.28		
Upper Sandusky.				6.21		
Champaign.				6.21		
North Lewisburg.				6.20		
Ontario.				6.20		
Rockliffe.				6.05		
Pennsylvania.						
Wellsborough.						
Wilkesbarre.	26, 27, 28	4.05		9.26		
Catawissa.	6	2.44		8.53		
Do.	26, 27	3.36		8.07		
Franklin.						
State College.				7.07		
				6.24		

Table of Excessive, Greatest, and Least Monthly Rainfalls.—Continued.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration.	Amount.	Station.	Amt.
Pennsylvania.—Continued.						
Grampian Hills.....				6.17		
Blooming Grove.....	26, 27	4.30		6.10		
Dyberry.....	18	2.20				
Do.....	26, 27, 28	3.00				
Easton.....	26, 27	2.25				
West Chester.....	27	2.23				
South Carolina.						
Allendale.....				11.33		
Georges.....				8.63		
Cherryw.....				7.54		
Columbia.....				6.18		
Tennessee.						
Near Alexandria.....				8.32		
Murfreesborough.....				7.56		
Hardison's Mills.....				7.52		
Florence Station.....				7.06		
Austin.....	10	2.25		6.82		
Riddleton.....				6.82		
Manchester.....				6.52		
Brownsville.....				6.43		
Fiat Creek.....				6.34		
Grand Junction.....				6.21		
Pulaski.....				6.06		
Savannah.....				6.08		
Howell.....				6.03		
Memphis.....	22	2.16				
Texas.						
Sour Lake.....				7.59		
Houston.....				7.32		
Rio Grande City.....	27	3.00		6.82		
Palestine.....	3	3.08	3 h. 14 m.	6.35		
Virginia.						
Marion.....				7.05		
Norfolk.....	13, 14	3.77		6.52		
Cape Henry.....	13, 14	3.52		6.14		
Wytheville.....	10	3.00				
West Virginia.						
Helvetia.....				6.55		
Wisconsin.						
Madison.....	2, 3	3.35		7.59		
Columbus.....				6.14		
Ripon.....	11	2.08				
Franklin.....	11	2.00				

Hail-storms of less violence have occurred in the various states and territories as follows:

*Colorado.*—West Las Animas, 3d; Fort Collins, 15th; Pike's Peak, 24th; Fort Lewis, 30th.

*Dakota.*—Bismarck, 4th; Fort Yates, 4th; Huron, 15th; Fort Sully, 17th; Fort Meade, 21st.

*Delaware.*—Delaware Breakwater, 19th.

*Georgia.*—Augusta, 14th.

*Illinois.*—Anna, 10th; Collinsville, 15th.

*Indiana.*—Wabash, 6th, 17th; Indianapolis, 10th; Vevay, 12th; Griffin Station, 16th.

*Iowa.*—Guttenburg, 11th; Indianola, 11th; Fort Madison, 15th; Independence, 16th.

*Kansas.*—Wellington, 5th; Salina, 5th, 12th, 24th; Yates Centre, 23d; Clay Centre, 23d.

*Maryland.*—Fallston, 10th.

*Massachusetts.*—Dudley, 6th, 7th; Somerset 13th.

*Michigan.*—Litchfield, 2d.

*Minnesota.*—Moorehead, 5th; Saint Paul, 7th.

*Missouri.*—Saint Louis, 15th; Curryville, 16th.

*Montana.*—Billings, 4th; Fort Ellis, 11th.

*Nebraska.*—Johnson, 1st; Table Rock, 1st; Stella, 1st; North Platte, 1st, 16th; Red Willow, 7th, 16th, 17th; De Soto, 15th; Fremont, 15th; Clear Creek, 15th, 20th; Omaha, 15th, 20th; Genoa, 15th, 22d, 23d, 24th.

*Nevada.*—Pioche, 15th.

*New Jersey.*—Bordentown, 19th; Moorestown, 29th.

*New York.*—Kiantone, 18th.

*North Carolina.*—Weldon, 18th.

*Ohio.*—Westerville, 6th, 17th; Wauseon, 17th.

*Pennsylvania.*—Chambersburg, Philadelphia, 19th.

*Wisconsin.*—Beloit, 11th; La Crosse, 11th; Madison, 16th; Sussex, 16th; Manitowoc, 16th, 23d.

*Wyoming.*—Fort Washakie, 7th, 8th.

#### SNOW.

Snow has been reported by the following stations:

Fort Garland, Colorado, 8th: snow fell to a depth one and one-half inches.

Pike's Peak, Colorado, 2d, 3d, 5th, 8th, 9th, 11th, 12th, 16th, 17th, 25th.

Cheyenne, Wyoming, 8th.

Denver, Colorado: a heavy snow-storm prevailed throughout this part of the state on the 8th, which is a most unusual occurrence at this season of the year. The following stations in Colorado report the following concerning this storm:

Central City: snowing steadily since 7 a. m.

Black Hawk: snowing hard all day.

Georgetown: snowing all day; two inches on the ground.

Leadville: snowing all day.

Texas Creek: snowing and cold.

Alamosa: snowed for one hour during the afternoon.

Salida: snowed hard during the day and night.

#### SLEET.

Sleet was reported on the summit of Pike's Peak, Colorado, on the 24th and 29th.

Table of rainy and cloudy days, relative humidity, and dew-point for June, 1883.

Districts.	Rainy days.	Cloudy days.	Rel. humidity. °	Dew-point.	
				Percentages.	°
New England.....	From 8 to 15	From 2 to 8	From 70.5 to 89.2	From 49.3 to 61.0	50.3 ° 53.0
" 9 " 17	" 1 " 6	" 63.9 " 86.0	" 58.4 " 69.0		
South Atlantic states.....	" 10 " 19	" 3 " 11	" 64.9 " 85.4	" 63.3 " 74.2	
Florida peninsula.....	" 10 " 23	" 2 " 18	" 72.0 " 78.7	" 72.8 " 73.9	
East Gulf.....	" 16 " 21	" 3 " 8	" 72.6 " 81.4	" 68.5 " 73.6	
West Gulf.....	" 9 " 13	" 1 " 10	" 71.7 " 80.0	" 67.2 " 74.9	
Ohio valley.....	" 17 " 20	" 4 " 11	" 66.5 " 73.9	" 58.2 " 64.2	
Tennessee.....	" 13 " 16	" 2 " 5	" 71.6 " 74.0	" 63.7 " 66.6	
Lower lakes.....	" 12 " 19	" 6 " 11	" 69.0 " 76.2	" 55.4 " 58.9	
Upper lakes.....	" 14 " 21	" 3 " 13	" 69.6 " 77.8	" 49.1 " 55.3	
Extreme northwest.....	" 7 " 14	" 4 " 6	" 67.6 " 72.1	" 50.3 " 53.0	
Upper Mississippi valley.....	" 10 " 19	" 7 " 12	" 62.0 " 74.0	" 53.8 " 60.3	
Missouri valley.....	" 10 " 16	" 1 " 7	" 68.7 " 73.0	" 54.0 " 60.9	
Northern slope.....	" 9 " 17	" 1 " 8	" 46.5 " 71.5	" 36.1 " 56.0	
Middle slope.....	" 7 " 15	" 2 " 6	" 50.6 " 70.2	" 44.7 " 58.9	
Southern slope.....	" 4 " 9	" 0 " 6	" 42.4 " 62.5	" 47.5 " 63.8	
Southern plateau.....	" 0 " 2	BONE	" 23.9 " 34.2	" 31.4 " 42.1	
Northern plateau.....	" 2 " 9	From 2 " 6	" 44.8 " 70.9	" 32.7 " 47.9	
North Pacific.....	" 2 " 3	" 3 " 4	" 55.6 " 62.2	" 40.0 " 48.9	
Middle Pacific.....	" 0 " 2	" 0 " 5	" 36.8 " 81.9	" 47.9 " 56.4	
South Pacific.....	" 0 " 3	" 0 " 3	" 51.6 " 75.8	" 58.2 " 65.1	
Mt. Washington, N. H.....	Seventeen	Three	90.0	43.6	
Pike's Peak Col. ....	Eleven	Three	81.4	25.9	
Salt Lake City, Utah.....	Five	Three	31.7	37.3	

\* Relative humidity corrected for altitude.

#### COTTON REGION REPORTS.

Temperature and rainfall observations in the cotton districts were continued during the month of June, 1883. The averages for the various districts, as determined from the observations made by the stations published in the REVIEW for April, 1882, are given in table below.

Meteorological Record of the Cotton Districts for the month of June, 1883.

Districts.	Average rain-fall in inches.	Temperature.		Extremes.	
		Mean of the maxima.	Mean of the minima.	Highest.	Lowest.
New Orleans.....	8.65	90.2	71.7	103	45
Savannah.....	5.93	91.1	71.3	104	55
Charleston.....	4.77	90.4	68.9	100	55
Atlanta.....	2.88	88.8	66.8	101	48
Wilmington.....	7.30	88.8	66.5	101	49
Memphis.....	4.52	89.2	67.1	99	48
Galveston.....	3.48	93.1	72.6	103	60
Vicksburg.....	5.43	90.7	70.2	98	58
Montgomery.....	5.03	89.3	69.4	102	50
Augusta.....	5.25	90.3	69.0	102	51
Little Rock.....	3.53	90.0	67.2	99.5	46
Mobile.....	4.54	92.5	69.5	104	53

#### WINDS.

The prevailing directions of the wind for the month of June, 1883, are shown on chart iii. by arrows flying with the wind. In the Southern states, Ohio valley, lower lake region, and along the Atlantic coast the prevailing winds are from the south and southwest; in the upper Mississippi and Missouri valleys they are from the north and northwest; in the northern slope they are from the west and southwest; in the north Pacific coast region, from northwest, and on the California coast they are westerly.

## HIGH WINDS.

On the summit of Mount Washington, New Hampshire, maximum velocities of fifty miles or more per hour occurred as follows: 64 nw., 1st; 72 nw., 4th; 80 nw., 5th; 56 nw., 6th; 58 nw., 8th; 72 s., 10th; 80 w., 11th; 128 nw., 12th (maximum for month); 80 nw., 13th; 90 nw., 14th; 64 s., 18th; 66 sw., 19th; 56 sw., 20th; 72 se., 28th; 60 nw., 29th; 72 w., 30th. The following high velocities were reported from Pike's Peak, Colorado: 53 nw., 1st; 50 sw., 3d; 54 nw., 4th; 60 w., 5th; 66 w., 10th; 72 w., 11th; 52 w., 12th; 52 sw., 13th; 80 sw., 14th (maximum for month).

Other stations reporting velocities of fifty miles or more per hour are as follows: Eagle Rock, Idaho, 52 s., 4th; North Platte, Nebraska, 90 sw., 16th; Dodge City, Kansas, 56 sw., 1st; Fort Elliott, Texas, 52 s., 16th; Cape May, New Jersey, 50 nw., 27th.

## TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England.....	Block Island, R. I.....	8,850	Eastport.....	4,243
Middle Atlantic states.....	Del. Breakwater, Del.....	9,617	Lynchburg, Va.....	2,283
South Atlantic states.....	Portsmouth, N. H.....	9,582	Augusta, Ga.....	2,547
Florida peninsula.....	Cedar Keys.....	7,010	Sanford.....	3,485
East Gulf.....	Pensacola, Fla.....	5,755	Montgomery, Ala.....	3,550
West Gulf.....	Indianola, Tex.....	7,853	Little Rock, Ark.....	2,477
Ohio valley.....	Louisville, Ky.....	5,280	Cincinnati, Ohio.....	3,737
Tennessee.....	Nashville.....	4,317	Memphis.....	2,667
Lower lakes.....	Buffalo, N. Y.....	6,654	Erie, Pa.....	4,855
Upper lakes.....	Grand Haven, Mich.....	6,915	Duluth, Minn.....	4,083
Extreme northwest.....	Bismarck, Dak.....	6,094	Saint Vincent, Minn.....	5,424
Upper Mississippi valley.....	Davenport, Iowa.....	5,984	Dubuque, Ia.....	3,833
Missouri valley.....	Huron, Dak.....	6,739	Omaha, Neb.....	2,255
Northern slope.....	Fort Assiniboine, Mont.....	7,831	Helena, Mont.....	4,387
Middle slope.....	Dodge City, Kans.....	9,536	Denver, Colo.....	3,964
Southern slope.....	Fort Concho, Texas.....	7,202	Colman City, Texas.....	4,556
Southern plateau.....	Fort Apache, Ariz.....	5,941	El Paso, Tex.....	3,700
Middle plateau.....	Spokane Falls.....	4,144	Lewiston, Idaho.....	1,953
Northern plateau.....	Portland, Oregon.....	3,806	Roseburg, Oreg.....	2,990
* Middle Pacific.....	San Francisco, Cal.....	9,158	Red Bluff, Cal.....	5,478
South Pacific.....	San Diego, Cal.....	4,793	Yuma, Ariz.....	3,783

\* No record at Cape Mendocino, Cal.

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements of the air were 24,570 and 14,684 respectively. At the former station 2,050 miles were recorded during the twenty-four hours ending at 11 p. m. of the 12th, which is the largest daily movement recorded at that station since its establishment in September, 1871.

## LOCAL STORMS.

**Arkansas.**—Watalula, Franklin county: a very severe wind-storm passed over portions of Franklin and Johnson counties during the evening of the 12th. At Watalula, the storm was very severe, destroying fences and outbuildings along the Mulberry valley. The windstorm was succeeded by very heavy precipitation, causing the streams to rise to great heights. Between 1 and 7.30 p. m. five successive storm-clouds, accompanied by torrents of rain, passed over this section. The Mulberry river valley, a fine agricultural region, was entirely submerged, totally ruining the growing crops. The damage sustained by the farmers in this vicinity is estimated at \$100,000. In the White Oaks valley, wheat fields ready for harvesting were ruined, and much fencing was destroyed. The corn and cotton fields were cleanly swept, and in many places the soil was badly washed and the fields were covered with sand and debris.

**Dakota.**—Pierre, Hughes county: the most severe wind-storm of the season passed over this place on the night of the 21st, blowing down several buildings.

**Georgia.**—Elberton, Elbert county: a tornado passed over this place on the afternoon of the 22d, blowing down a number of buildings and causing other damage.

**Illinois.**—Mount Vernon, Jefferson county: a violent wind-

storm occurred at this place on the afternoon of the 6th. No serious damage was done in this city, but in the suburbs, trees and fencing were blown down.

Carrollton, Greene county: a very heavy wind and rain storm occurred at this place, on the afternoon of the 8th. The storm continued for about three hours, and was accompanied by a slight fall of hail.

Springfield: a heavy storm of wind and rain struck the western part of this city, at about 8 p. m. of the 8th. Several houses were unroofed, and barns and fences were blown down. Reports from Bluffs, Chapin, Jacksonville, Berlin, and other points along the Wabash railroad, state that the rain accompanying this storm was the heaviest that has fallen at these places for several years, and that much damage has been done to crops.

Cairo: reports from Williamson county state that, between 9 p. m. and midnight of the 9th, a tornado passed through the southwestern part of that county, causing much damage to orchards and fences. The track of the tornado was about one-fourth of a mile in width.

Harvard, McHenry county: a tornado passed a short distance southeast of this place on the evening of the 11th, destroying dwellings, barns, and fences.

Lebanon, Saint Clair county: about 10 a. m. of the 15th, a tornado-cloud was observed approaching this place from the northwest. Before reaching here the cloud separated into two parts, one passing north and the other south of the city. The approach of the storm caused great alarm to the citizens but no serious damage resulted.

Decatur, Macon county: in this vicinity, during the storm of the 17th, many trees were blown down and buildings unroofed.

Oakdale, Washington county: the storm of the evening of the 20th caused much damage in this county to fences, trees, and crops. At this place the roof of a church was blown off.

Carmi, White county: during the night of the 21st and 22d a terrible rain and wind-storm passed over this locality. Considerable damage was done to the growing crops and to the unharvested grain. Fruit trees and buildings were blown down and stock killed. The fallen trees on the railroads caused delay of trains.

A severe storm occurred in Jackson county on the 23d; it was accompanied by a remarkably heavy rainfall, which caused a large amount of damage by washing away bridges and culverts.

**Indiana.**—North Vernon, Jennings county: a severe storm passed through the southern part of this place during the night of the 10-11th, destroying several houses and one brick church. A train on the Ohio and Mississippi railroad was blown from the track about seven miles east of this place. At Osgood, Ripley county, several houses were blown down, and two persons were reported to have been killed.

**Iowa.**—Council Bluffs: at 6 p. m. of the first, a very severe rain-storm visited this vicinity. Indian creek, which runs through this city, overflowed its banks; seven iron bridges and two stone culverts were swept away, and also several dwellings and barns along the creek. All business houses on Main and Broadway streets were flooded, and several losses of life were reported. The damage is roughly estimated at \$200,000.

Brush Creek, Fayette county: at 3 p. m. of the 11th, a tornado struck this place, destroying about one-third of the town. The losses are estimated at from \$30,000 to 40,000.

Elkport, Clayton county: a tornado occurred at this place on the 11th, demolishing several buildings. The tornado was preceded by a heavy fall of hail.

**Kansas.**—El Dorado, Butler county: a heavy rain storm visited this locality on the night of the 5-6th, causing much damage to crops by flooding the low-lands.

Topeka: the storm which occurred during the night of the 5-6th, was unusually severe. Hail caused considerable damage in the northwestern counties.

Fort Riley, Davis county, between 9 and 10 p. m. of the 11th, a heavy storm of wind and rain passed over this place,

unroofing buildings and causing much damage to trees and fences.

*Abiline*, Dickinson county: a severe storm of rain and hail occurred about twelve miles north of this place at 10 p. m. of the 11th, and caused much damage. The village of Industry, in Clay county, was almost totally destroyed, every house but two having been blown down.

*Valley Falls*, Jefferson county: a severe storm passed over this place at 1.45 a. m. of the 12th. Many buildings at this place and in surrounding localities were damaged.

*Atchison*: at 12.30 a. m. of the 23d, this city was visited by a severe storm of wind and rain. The sewers and culverts were overflowed, and much damage caused by flooding cellars.

*Massachusetts*.—*Boston*: a severe storm passed over this city at about 5 p. m. of the 29th. The storm approached from the southwest, and was the most violent that has occurred here since the storm of July, 1879. It was accompanied by hail and torrents of rain. Considerable damage was done throughout the city and vicinity.

*Michigan*.—*Muskegon*, Muskegon county: this vicinity was visited by a severe wind and hail storm on the morning of the 2d. The smoke-stacks of several mills, and trees were blown down, and other damage done.

*Detroit*: reports from Van Buren county state that a heavy rain storm visited that section on the afternoon of the 17th, badly washing the roads and fields and sweeping away bridges.

*Mississippi*.—*Baldwyn*, Lee county: between 6 and 7 p. m. of the 6th, a very remarkable fall of rain occurred at this place. The day had been warm, and during the afternoon two masses of dense cumulus clouds approaching from nearly opposite directions met over this place. As they commingled, blinding sheets of water were precipitated. The area of the storm extended east and west about three and one-half miles, and north and south about five miles. The amount of rainfall during the storm, which lasted about forty-five minutes, is estimated at more than 9.00 inches.

*Missouri*.—*Carrollton*, Carroll county: a severe storm visited this place on the 12th, but caused no damage.

*Springfield*: the rain-storm of the 9th caused damage estimated at \$50,000 in this locality. Over 50,000 feet of lumber and a bridge were washed away.

*Jefferson City*: on the evening of the 9th this section was visited by a very severe and destructive storm. Buildings were unroofed and several railroad bridges were blown down. On the afternoon of the 22d this city and vicinity were visited by another severe storm. It came from the north, striking the Missouri river near Cedar City, in Callaway county. At Jefferson City the storm caused serious damage to buildings, fences, and trees.

*Columbia*, Boone county: this city was visited by a destructive storm at 11.30 a. m. of the 22d. A large number of buildings in this vicinity were damaged. Reports from surrounding localities state that fences were swept away and great injury done to farm-houses and grain.

*Booneville*, Cooper county: a violent storm occurred at this place about 12.30 of the 22d. The storm approached from the north and west, and continued for more than thirty minutes. Serious damage was done to buildings in this locality.

*Chillicothe*, Livingston county: a severe storm visited this section on the 12th, causing much damage. At Utica a brick church was demolished, and at Sumner City, eleven buildings were destroyed. On the evening of the 20th, a violent storm passed over the southwestern part of this county. The storm began at about 9 p. m., and continued for two hours. Its general course was from west to east. The damage to buildings and crops is very great. The fields were strewn with household goods and debris of various kinds. The width of the storm-track was about one and one-half miles, and was sharply defined along its course. Two persons were killed and several injured. Damage to the extent of \$20,000 was done in this locality.

*Sedalia*: between 12 m. and 1 p. m. of the 22d, a violent

wind and rain storm prevailed at this place, during which several buildings in this city were damaged.

*Nebraska*.—*North Platte*: a violent storm occurred on the evening of the 16th, during which a wind velocity of ninety miles per hour was recorded. Light buildings, chimneys, awnings, &c., were blown down. Hail accompanied the storm, and caused damage to windows and skylights.

*Omaha*, 17th: reports from the northern and western parts of the state show that a severe storm prevailed on the night of the 16-17th, causing much damage to property and almost entire suspension of railway traffic. At Neligh, on the Sioux City and Pacific railroad, a number of buildings were blown down and several persons injured.

*Lincoln*: the heavy rain storm of the night of the 22d, caused washouts on the railroads running southward from this city. Near Atchison and also at Sterling, several small breaks occurred.

*Millard*, Douglas county: during the early morning of the 23d, a tornado struck this village, causing great destruction of property. A new dwelling was lifted from its foundation and carried a distance of thirty-two feet. Many barns and orchards in this locality were seriously injured. The storm moved from northwest to southeast.

*New Jersey*.—*Bordentown*, Burlington county: during the storm of the 19th, buildings were damaged to a considerable extent and large trees uprooted.

*New York*.—*Menand* station (near Albany): a very heavy rain storm occurred at this place on the 6th, causing much injury to gardens and roadways.

*Albany*: a severe storm occurred on the afternoon of the 6th, causing damage estimated at \$50,000. Several objects were struck by lightning during the storm. Much of the damage done was caused by flooding cellars and basements.

*Rochester*: during the storm of the 11th, a number of bathing houses were destroyed, and much injury was done to fruit and shade trees.

*Kiantone*, Chautauqua county: a severe storm occurred here on the 12th, unroofing buildings and prostrating trees and telegraph poles.

*New York City*: on the afternoon of the 13th, a storm of unusual severity visited Hempstead, Garden City, and adjacent parts of Long Island. Buildings were blown down and unroofed, and a number of persons were injured.

*North Carolina*.—*Wilmington*: a severe storm occurred on the 2d, during which the barge "Modoc" was capsized and sunk. Many trees were uprooted and telegraph lines damaged.

*Ohio*.—*Jacksonburg*, Butler county: during the storm which occurred on the evening of the 10th, a number of houses were unroofed in the western part of this county. In Wayne township serious damage was done to buildings and orchards.

*Dayton*: high winds with heavy rains prevailed on the 16th, causing much damage in this city and vicinity.

*Millersburg*, Holmes county: a severe storm visited this place on the afternoon of the 18th. Several houses were unroofed and many trees uprooted. The storm was accompanied by hail which did great damage to crops in that region.

*Steubenville*, Jefferson county: during the evening of the 18th, a severe storm passed over the northern part of this city, causing damage estimated at \$15,000.

*Pennsylvania*.—*Williamsport*; a very severe storm, accompanied by heavy rain and hail, visited the Muncey valley region on the evening of the 17th. A number of buildings were damaged, bridges over small streams were washed away, and a large amount of grain was destroyed. The track of the Reading railroad for a considerable distance was badly damaged. The storm passed into Northumberland county, where much damage was done to bridges, grain, and fruit.

*Reading*: during the night of the 7-8th, this vicinity was visited by a very severe storm, during which several houses were damaged by lightning. This place was again visited by a destructive storm on the morning of the 19th. Many fields were badly washed and a large quantity of grain was destroyed.

Penn's Manor, Bucks county: at 4 p. m. of the 19th, a very violent and destructive storm occurred in this vicinity. The storm came from the southwest, making its appearance suddenly, and was of about twenty minutes duration. Large numbers of dwellings and trees were blown down, and the railroads were blockaded with the fallen débris. The total loss caused by the storm is estimated at \$25,000.

Harrisburg: this city was visited by a very severe storm during the night of the 17th. Many buildings were unroofed and trees and telegraph poles prostrated.

*Province of Ontario.*—Chatham: during the afternoon of the 18th a severe wind and rain-storm passed over this section. An unfinished bridge across the Thames river was completely destroyed. Several trees were uprooted and other damage done.

*Province of Quebec.*—Saint Johns: a severe storm of rain and hail visited this section on the afternoon of the 6th. A number of houses were unroofed and a large amount of lumber was blown from the wharves into the river.

*Tennessee.*—Memphis: between midnight and 1 a. m. of the 23d a violent thunder-storm passed over this city; no serious damage was reported.

*Texas.*—Greenville, Hunt county: a severe storm occurred at this place on the night of the 2-3d, causing damage estimated at from \$50,000 to \$70,000. One person was killed and several injured.

McKinney, Collin county: a tornado occurred west of this place on the evening of the 9th, which caused much injury to crops. The path of the tornado was about one hundred and fifty yards wide. At this place a heavy hail storm occurred, the hail-stones being of unusual size.

*West Virginia.*—Martinsburg: a very severe and destructive storm passed over this locality at about 4 p. m. of the 9th. It continued for forty minutes, causing great damage in the immediate vicinity to fruit trees and other property. The estimated loss is about \$5,000.

*Wisconsin.*—Fond du Lac, Fond du Lac county: a severe wind and rain storm visited the southern part of this county at 6 a. m. of the 2d. In the immediate vicinity of this city very little damage was done, but at Oakfield, nine miles south, the storm was more destructive. About one hundred and fifty barns in this county were destroyed. The loss to property in this county, aside from the damage to crops, is estimated at \$50,000.

Brandon, Fond du Lac county: a severe storm passed over this village on the morning of the 2d. The most serious damage done was to the shade trees and orchards. Numerous buildings were unroofed and sheds and light outbuildings were blown down.

Port Washington, Ozaukee county: a severe storm passed over the northern part of this country between 6 and 7 a. m. of the 2d, causing a large amount of damage. Over two hundred buildings were destroyed in the towns of Belgium and Fredonia, at which places the storm raged with unusual violence.

Necedah, Juneau county: during a severe storm, on the morning of the 2d, a part of the bridge over the Wisconsin river, three miles east of this place, was carried away, entailing a loss of 4,000. Buildings and crops in Adams county were damaged to a considerable extent.

Elmo, Grant county: a violent storm occurred at this place on the afternoon of the 11th. A freight train on the Galena division of the Chicago and Northwestern railroad was lifted from the track. A large amount of damage was done in this vicinity.

Beloit, Rock county: a violent storm occurred at this place at about 6 p. m. of the 11th. A large number of houses were unroofed and great damage was done to the mills and factories along the water power. The water in the river rose very rapidly, flooding many cellars. The bridge of the Chicago and Northwestern railway was totally destroyed. Three persons were reported to have been killed. The damage caused by the storm is estimated at \$100,000.

#### LOW TIDES.

Indianola, Texas, 24th, 26th, 27th.

#### VERIFICATIONS.

##### INDICATIONS.

The detailed comparison of the tri-daily indications for June, 1883, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 85.10 per cent. The percentages for the four elements are: weather, 85.04; direction of the wind, 84.73; temperature, 85.27; barometer, 85.39 per cent. By geographical districts, they are: For New England, 85.24; middle Atlantic states, 86.62; south Atlantic states, 90.01; eastern Gulf, 85.08; western Gulf, 82.84; lower lakes, 81.46; upper lakes, 85.55; Ohio valley and Tennessee, 85.99; upper Mississippi valley, 85.70; Missouri valley, 82.39.

There were sixty-two omissions to predict out of 3,600, or 1.72 percent. Of the 3,538 predictions that have been made, one hundred and sixty-nine or 4.78 per cent., are considered to have entirely failed; eighty-seven or 2.46 per cent were one-fourth verified; four hundred and eighty-one or 13.59 per cent., were one-half verified; two hundred and nine or 5.91 per cent., were three-fourths verified; 2,592 or 73.26 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

The following percentages of verifications are for the month of August, 1882, which were not published in the REVIEW for that month:

The detailed comparison of the tri-daily indications for August, 1882, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentages of verifications to be 84.6 per cent. The percentages for the four elements are: weather, 91.0; direction of the wind, 84.4; temperature, 80.8; barometer, 81.6 per cent. By geographical districts they are: for New England, 84.1; middle Atlantic states, 84.9; south Atlantic states, 87.1; eastern Gulf, 86.5; western Gulf, 86.7; lower lakes, 86.9; upper lakes, 82.5; Ohio valley and Tennessee, 84.9; upper Mississippi valley, 79.9; Missouri valley, 80.7; north Pacific, 88.9; middle Pacific, 98.2; south Pacific, 99.1. There were one hundred and twenty-three omissions to predict (nineteen being due to the absence of reports from the Pacific coast) out of 3,813, or 3.2 per cent. Of the 3,690 predictions that have been made, one hundred and fifty-four, or 4.2 per cent., are considered to have entirely failed; one hundred and nine, or 2.9 per cent., were one-fourth verified; four hundred and fifty-six, or 12.4 per cent., were one-half verified; four hundred and ten, or 11.1 per cent., were three-fourths verified; 2,561, or 69.4 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

#### CAUTIONARY SIGNALS.

During June, 1883, fifty-one cautionary signals were displayed. Of these, forty-one, or 80.39 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. These do not include signals ordered at display stations, where the velocity of the wind is only estimated. No cautionary off-shore signals were ordered during the month. Three signals were ordered late.

One hundred and thirty-eight winds of twenty-five miles or more per hour were reported for which no signals were ordered; many of these were high local winds or strong sea breezes.

#### NAVIGATION.

##### STAGE OF WATER IN RIVERS.

In the lower Missouri river, and in the Mississippi in the vicinity of Saint Louis, the water rose above the danger-line during the latter part of the month. The Missouri, at Leavenworth, Kansas, reached its highest stage on the 26th, when it was five inches above the danger-line.

The Mississippi, at Saint Louis, Missouri, was above the danger-line from the 17th to the end of the month. The highest stage occurred on the 25th, on which date the water was

four feet and five inches above the danger-line. At the close of the month the river was still two feet and seven inches above the danger-line. At Keokuk, Iowa, and Cairo, Illinois, the river rose nearly to the danger-line, the highest stage occurring at Keokuk on the 21st, and at Cairo from the 24th to 27th.

The Ohio river remained low throughout the month.

The highest and lowest stages of water observed at the Signal-Service stations during the month of June, 1883, are shown in the following table:

*Heights of rivers above low-water mark, June 1883.*

Stations.	Danger point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
Red River:					
Shreveport, La.	ft. In.	28	ft. In.	2	ft. In.
Arkansas:					
Little Rock, Ark.	30 0	14	20 6	30	5 10
Fort Smith, Ark.		11	15 9	28	1 3
Missouri:					
Yankton, Dakota	20 0	15, 16, 17	7 9	10, 11	6 0
Omaha, Nebr.	16 0	28	14 2	17	9 9
Leavenworth, Kans.	21 0	26	21 5	1, 2	14 6
Mississippi:					
Saint Paul, Minn.	14 6	8, 9, 10	8 6	30	5 7
La Crosse, Wis.	18 0	23	7 6	8	6 0
Dubuque, Iowa	21 10	29	10 6	11	9 3
Iowa:	15 0	5	8 6	9, 10, 11,	7 10
Keokuk, Iowa	24 6	21	14 0	30	10 0
Saint Louis, Mo.	30 0	25	34 10	6	22 8
Cairo, Ill.	40 0	24 to 27	39 3	7	31 6
Memphis, Tenn.	34 0	27 to 30	31 2	10	25 2
Vicksburg, Miss.	41 0	25	39 9	1	38 5
New Orleans, La. †	—2 6	1	— 1 0	28	— 2 10
Ohio:					
Pittsburg, Pa.	20 0	14	5 2	11	0 1
Cincinnati, Ohio.	50 0	4	30 7	30	15 5
Louisville, Ky.	24 0	4	11 5	30	8 6
Cumberland:					
Nashville, Tenn.	42 0	13	27 3	25	5 11
Tennessee:					
Chattanooga, Tenn.	33 0	15	6 11	5	3 3
Monongahela:					
Pittsburg, Pa.	29 0	14	5 2	11	0 1
Savannah:					
Augusta, Ga.	30 0	26	15 4	21	6 0
Willamette:					
Portland, Oreg.	14, 15	17 10	9	15 11	
Sacramento:					
Red Bluff, Cal.	1	2 8	27	1 0	
Sacramento, Cal.	1	20 0	30	10 0	
Mobile:					
Mobile, Ala.	9	17 9	29	16 0	
Colorado:					
Yuma, Arizona.	29, 30	23 11	1	22 2	

† Below high-water mark of 1874.

#### FLOODS.

During the latter part of the month very destructive floods occurred in the Missouri river, and in the Mississippi river between Saint Louis, Missouri, and Cairo, Illinois. Large areas of valuable agricultural land adjacent to these rivers were inundated, causing a large amount of damage, and in some localities loss of life. Damaging freshets have occurred in many of the states, but, with the exception of the floods in the Missouri and Mississippi rivers, they were of local character and were confined to the smaller rivers and streams. The following reports, concerning the floods of June, have been collected from the various states:

**Arkansas.**—Lead Hill: the heavy rains of the 9th, caused the north fork of the White river to overflow its banks. Much fencing was washed away, and crops were badly damaged.

**Helena,** 22d: the river at this place continues to rise. Near Friar's point, Mississippi, the water has broken through an old crevasse, which will probably result in inundating a large territory contiguous to that place. On the Arkansas shore the water is spreading uninterruptedly, and will cover a large area.

**Colorado.**—Denver, 22d: the high temperatures of the past two days rapidly melted the snow in the mountains, causing the tributaries to the south Platte river to rise very fast. Two bridges across the Cache Lapoudre river, in the vicinity of Fort Collins, were carried away. On this date, it was reported that the Grand and Blue rivers, on the western side of the conti-

nental divide, were higher than ever before known, and that nearly all bridges in Summit and Garfield counties were washed away. Mining operations in these sections were seriously interrupted on account of the flooded condition of the country.

**Fort Collins,** Larimer county: owing to the heavy rain of the 16th, the banks of the canal broke at a point about fifteen miles north of Windsor, Routt county. The water from the canal flooded what is known as Black Hollow, drowning a large number of sheep.

**Illinois.**—Bloomington, McLean county: a very heavy rain occurred on the 16-17th, throughout central Illinois. A serious washout occurred on the Chicago & Alton railroad, causing delay of trains.

**Carrollton,** Greene county, 18th: reports from Bluffdale state that the Illinois river has reached the highest point ever known. The damage caused by the floods, in the vicinity of Bluffdale, is estimated at \$50,000.

**Lebanon,** Saint Clair county, 22d: the recent heavy rains have swollen all streams in this vicinity. Big Silver creek overflowed its banks, completely inundating the adjacent lowlands, which were under cultivation. A large acreage of wheat and corn—the former being ready for harvest—will prove a total loss.

**Cairo:** the lowlands in the immediate vicinity of Cairo, along the Mississippi river, were overflowed after the 20th. Fields of wheat, corn, and potatoes were destroyed.

**White Hall,** Greene county: a very heavy rain-storm occurred on the 16th. The Chicago, Burlington, and Quincy reservoir broke during the morning and washed away about 3,000 feet of railroad track. A number of bridges on the streams in this vicinity were washed away. All of the bottom lands along the Apple creek were submerged, the fences carried away, and crops destroyed.

**Anna,** Union county: on the 21st the river rose rapidly, flooding the adjacent farms and causing much damage to wheat and corn.

**Havana,** Mason county: a very heavy rain-storm occurred on the night of the 21-22d, which caused the Illinois and Spoon rivers to overflow the levees.

**Chester,** Randolph county: during the night of the 24th a break occurred in the Saint Mary's levee on the opposite side of the river in Missouri. In the Saint Mary's lowlands a large area of wheat land was flooded. From Chester to Grand Tower, southward on the Illinois side, a distance of twenty-five miles, with an average width of ten miles, the country was almost completely submerged, destroying the crops and entailing great loss.

**East Saint Louis,** Saint Clair county: on the morning of the 23d, the Madison dyke broke, flooding the bottom lands lying north of this place. Hundreds of families in this section were rendered homeless. On the afternoon of the 24th, the water which passed through the Madison dyke reached a point a short distance above Venice, making a large crevasse in the Chicago & Alton railroad embankment. About six hundred feet of the track was washed away. The tracks of the Indianapolis and Saint Louis, and the Wabash railroads were also washed away, cutting off all direct railroad communications with points north of this place. The break in the Chicago & Alton track flooded nearly all of the eastern part of Venice and forced many families to vacate their homes. On this date, it was estimated that about 15,000 acres of farm land north of East Saint Louis were under water and that the loss to crops would not be less than \$200,000.

**Mitchell,** Madison county: on the 25th, the country west of this place, for a distance of six and one-half miles, was covered with water, varying in depth from four to forty feet. Many houses were submerged and much stock drowned. On the 25th about 30,000 acres of land were overflowed. In east Saint Louis the situation had become more serious. The loss to the elevators and crops was estimated at \$1,000,000. The Saint Louis & Cairo belt-line sustained damages to the extent of

\$50,000, and a large ice-house was washed away, entailing a loss of \$40,000. The town of Cohkia, near Carondelet, was entirely submerged.

*Kansas.*—Leavenworth: the heavy rains of the 16th and 17th, caused numerous washouts and land slides on the railroads in this vicinity. A number of bridges in this and adjoining counties were washed away by the smaller streams. On the 19th, the railroad tracks were overflowed near Atchison and Wyandotte, Kansas. The river rose to the danger line at this place on the afternoon of the 25th, at which time all of the bottom lands in the vicinity were overflowed. The river fell below the danger line on the 28th.

*Maryland.*—Baltimore: the heavy rains of the 27th, caused damage to the wheat and hay crops in the surrounding country.

*Michigan.*—Kalamazoo, 30th: on this date the Kalamazoo river reached the highest point known for years.

*Mississippi.*—Vicksburg: the bridge over Dry Grove Bayou, on the Natchez & Jackson railroad, was washed away on the 15th, causing suspension of travel.

*Missouri.*—Saint Louis: the river at this place rose to the danger-line on the 17th; it continued to rise until the 26th, and afterwards fell steadily until the close of the month, at which time it was two feet above the danger point. On the 19th, a large part of the central levee was submerged. On the 20th the river steamers were compelled to deliver freight at points north of the bridge, on account of the high water. Traffic on the Wabash railroad was suspended on the 21st, and on the roads running west on the 22d. The river reached its highest stage on the 26th, at which time it was four feet and ten inches above the danger-line. The highest stages of water recorded since the establishment of the signal office in this city are as follows:

Year.	Month.	Date.	Height of river.	
			Feet.	Inches.
1873.....	June.....	13, 14	23	0
1873.....	April.....	11	25	5
1874.....	April.....	24	18	11
1875.....	August.....	3	20	11
1876.....	May.....	10, 11	32	6
1877.....	June.....	14	26	7
1878.....	June.....	16	25	9
1879.....	July.....	3	21	2
1880.....	July.....	10, 11, 12	25	5
1881.....	May.....	5	33	8
1882.....	July.....	5	32	5
1883.....	June.....	25	34	10

Saint Joseph: the heavy rains of the 16th and 17th in this vicinity caused the suspension of travel on various railroads, and serious injury to the roadbeds. About forty bridges on the Saint Joseph & Western railroad were more or less damaged.

Booneville, Cooper county: the river, at this place, rose rapidly on the 17th and 18th, flooding the lowlands and a part of the Missouri Pacific railroad track.

Marysville, Nodaway county, 18th: the recent heavy rains have done great damage in this county. Nearly half of the bridges in the county have been swept away. A new iron bridge over the river at Barnard, and about one-half mile of the Wabash railroad track, were also washed away. On the 22d, the floods were rapidly subsiding.

Kansas City: Owing to the overflowed condition of the railroad tracks running north and east of this city, trains were unable to pass over these roads on the 17th. A large area near Harlem, Clay county, was inundated and the crops were entirely ruined. At Harlem the water broke through the embankments and flooded the town, compelling the inhabitants to abandon their homes. Freight cars were placed at points along the overflowed track of the Hannibal & Saint Joe railroad to prevent the tracks from being washed away.

Washington, Franklin county: on the 19th, Boeuff island, five miles above this place, was almost entirely inundated. Buse's island, two miles from this place was also inundated and the residents were compelled to move from their homes. In North Washington the stores and residences were reached by means of skiffs.

Morrison, Gasconade county: this place was almost entirely inundated on the 22d, and all farms in the lowlands were overflowed. The people were compelled to leave their homes.

Herman, Gasconade county: the river at this place rose to twenty-four feet above low-water mark, on the 20th, at which time it was higher than has been known since 1844. On this date the farmers on Loutre island opposite Hermann, moved their stock to the hills. Several families were compelled to leave their homes. The losses sustained by the farmers are estimated at from \$60,000 to \$75,000.

Albany, Gentry county: a very heavy rain occurred here on the morning of the 20th, causing much damage by washing out bridges and drowning stock. The losses sustained in this county are estimated at \$500,000.

Ashland, Boone county, 20th: the river broke over the levees at a point seven miles below this place, submerging the entire bottom lands for a distance of forty miles, and causing great damage to the growing crops.

Saint Charles, Saint Charles county: all of the bottom lands in this vicinity were under water on the 21st. The town of Brotherton was entirely swept away by the flood. The car shops were compelled to suspend work on this date, the water having reached the engine-room.

Portage des Sioux, Saint Charles county: the country adjacent to this place was completely submerged on the 26th. On the 25th, the river overflowed its banks at Willow Slough, two miles below Saint Charles, and inundated the farms in that locality.

Rochefort, Boone county: the bottom lands along the river in this vicinity were completely inundated on the 21st, causing great damage to wheat and corn. The lower part of the town was submerged, and the residents were compelled to move. Overton, on the opposite side of the river, was almost surrounded by water.

Jefferson Barracks, 22d: the high water has caused considerable damage at this place. The floors of the water-works' engine-rooms were covered to a depth of nearly six feet, and the water supply was cut off. Several houses were submerged and the people compelled to seek higher ground.

Waverly, Lafayette county, 22d: thousands of acres of corn and wheat in this locality were destroyed by the floods, and a large number of people have been forced to abandon their homes.

Jefferson City, 22d: the water in the Missouri river at this place reached the highest point known since the memorable flood of 1844. The damage in this city arose chiefly from the backwater from Wear's creek, which flows through the western part of the city. All of the gardens in the vicinity of the creek for a distance of about one mile were inundated, and in many of the houses the water rose to depths of several feet. Cedar City, a town of about three hundred inhabitants, situated nearly opposite this place, was partly submerged, and nearly all of the farms in the lowlands were under water.

*Nebraska.*—Lincoln, Lancaster county: the heavy rain-storm of the 16th was the severest experienced in eastern Nebraska for many years. About one hundred houses in the lowlands adjacent to this city were surrounded by water. Nearly all of the bridges in the county were swept away. More than one hundred houses in Tecumseh, Richardson county, were submerged. Many miles of railroad track were washed out and much stock drowned.

Omaha, 22d: the first trains from Pawnee county since the 17th arrived on this date, and report that a large section of country was flooded by the overflowing of the Little Nehama river. Sixteen persons were drowned in Pawnee county, and four others were drowned in other localities. Crops were damaged to some extent, and a large quantity of old corn was ruined. The injury to crops, buildings, household goods, live stock, and railroads in southeastern Nebraska is very great.

Table Rock, Pawnee county: the heavy rains of the 17th caused a general overflow of the creeks in this part of the state. The crops in the lowlands along the Nehama river were destroyed by the overflow.

*Clear Creek, Saunders county:* on the 18th, the Platte river reached the highest point that has been known at this place during the past sixteen years.

*Tecumseh, Johnson county:* a very heavy rain storm occurred on the night of the 22-23d, causing the streams in this vicinity to overflow. Bridges valued at 50,000 were washed away; large numbers of hogs and much cattle were drowned, and the crops in the lowlands were badly damaged. The total loss in Johnson county will exceed \$300,000.

*New Hampshire.*—Bristol, Grafton county: on the 20th and 21st the Pemigewasset river rose nine feet in twenty-four hours, and reached the highest point that has been known at this place for several years.

*New Jersey.*—Trenton, 29th: the Delaware river at this place reached a higher point on this date than has been known for years. Reports from points above this place state that the recent heavy rains have swollen the streams tributary to the Delaware to a greater extent than has been known during the last twenty years.

*Ohio.*—Xenia, Greene county: a very heavy rain fell at this place during the night of the 16-17th. The north branch of Shawnee creek overflowed its banks, submerging a number of houses in the vicinity of the creek and flooding many cellars in various parts of this city. Washouts occurred on almost all railroads running into Xenia.

*Pennsylvania.*—Scranton: the rainstorm on the night of the 18-19th caused considerable damage in this vicinity. A number of business houses sustained heavy losses from having their cellars flooded. Some damage was also done by lightning.

*Wyoming.*—Cheyenne: the heavy rains of the 16th flooded the business part of the city and caused much damage. All cellars and basements were wholly submerged, and in some parts of the city the streets were covered to depths of from one to three feet. The damage is estimated at \$50,000.

#### ATMOSPHERIC ELECTRICITY.

##### AURORAS.

On the night of the 30th, an auroral display was observed from New England to Dakota. This was the most extensively observed display of the month, but none of the stations at which it was observed report it as being brilliant. The following reports relate to this display:

*Eastport, Maine, 30th.*—Faint auroral light at 11 p. m.

*Portland, Maine, 30th.*—Aurora observed from 7.30 to 11.30 p. m., consisting of a segment of dark haze surmounted by an arch of greenish light, and rose colored streamers.

*Mount Washington, New Hampshire, 30th.*—An aurora was observed at this place from 9.30 p. m. of the 30th, until 1 a. m. of July 1st. The light extended to an altitude of about 15° and over about 40° of the horizon. Auroral beams and flashes were numerous and brilliant.

*Point Judith, Rhode Island, 30th.*—A faint aurora was observed at 10:25 p. m., which continued until after midnight.

*Provincetown, Massachusetts, 30th.*—A faint aurora was visible at this place from 8:45 to 11 p. m.; a few streamers rose to an altitude of 45°.

*Oswego, New York, 30th.*—An aurora was observed at 10 p. m., consisting of straw color light, which extended to an altitude of about 30°.

*Mackinaw City, Michigan, 30th.*—A poorly defined auroral light, of pale yellowish color, was observed at 10 p. m.

*Duluth, Minnesota, 30th.*—An auroral light was observed at 12:05 a. m. of July 1st. It consisted of a pale whitish color, and disappeared during the early morning.

*Bismarck, Dakota, 30th.*—An aurora was observed from 11 p. m. until midnight, the light extended to an altitude of 15°. This display was also reported by the following stations: Gardiner, Maine; Newport and Lunenburg, Vermont; Cambridge, Fall River, and Rowe, Massachusetts; Southington, Connecticut; Ithaca, and North Volney, New York; Canal Dover, Ohio; Northfield, Minnesota; Fort Madison, Iowa.

Auroral displays on other dates occurred as follows:

1st.—Gardiner and Eastport, Maine; Newport, Vermont; Cambridge, Massachusetts; Tobacco Garden, Dakota.

2d.—Eastport, Maine; Cambridge, Massachusetts; West Washington, District of Columbia; Freehold, New Jersey.

3d.—Burlington, Vermont.

4th.—Lansing, Michigan.

6th.—Fort Madison, Iowa.

7th.—Keokuk, Iowa; Lansing, Michigan.

8th.—Gardiner and Eastport, Maine.

11th.—Bordenton, New Jersey.

12th, 13th, and 14th.—Lansing, Michigan.

15th.—Bordenton, New Jersey; Wilkesbarre, Pennsylvania.

21st.—Clear Creek, Nebraska.

26th.—Fort Madison, Iowa.

27th.—Franklin and LaCrosse, Wisconsin; Moorhead, Minnesota; Clear Creek, Nebraska.

29th.—Dudley, Massachusetts.

#### THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

*New England.*—4th to 8th, 10th to 13th, 17th to 21st, 28th, 29th, 30th.

*Middle Atlantic states.*—4th to 13th, 16th to 22d, 24th to 30th.  
*South Atlantic states.*—1st, 3d to 26th, 28th, 29th, 30th.

*Florida peninsula.*—1st to 4th, 6th to 9th, 11th, 12th, 14th, 15th, 17th, 20th, 21st, 24th, 25th, 29th, 30th.

*Eastern Gulf.*—1st to 15th, 19th to 30th.

*Western Gulf.*—1st to 10th, 12th, 13th, 17th, 18th, 19th, 21st to 30th.

*Tennessee.*—2d to 13th, 16th, 18th, 19th, 21st to 26th, 28th, 29th, 30th.

*Ohio valley.*—2d to 10th, 12th, 13th, 16th to 21st, 23d to 29th.

*Lower lakes.*—2d to 7th, 9th to 12th, 16th to 19th, 24th, 25th, 26th, 29th, 30th.

*Upper lakes.*—1st, 2d, 3d, 5th, 6th, 9th to 12th, 16th to 19th, 21st, 23d, 24th, 25th, 27th, 29th.

*Extreme northwest.*—4th, 5th, 7th, 14th to 17th, 19th, 21st, 22d, 26th.

*Upper Mississippi valley.*—1st to 12th, 14th to 24th, 28th, 29th.

*Missouri valley.*—1st to 12th, 14th to 24th.

*Northern slope.*—1st to 4th, 7th, 9th, 10th, 13th to 23d, 25th, 29th.

*Middle slope.*—1st to 11th, 14th to 19th, 21st to 24th, 26th, 27th, 28th.

*Southern slope.*—1st to 4th, 6th to 13th, 16th, 17th, 26th, 27th, 28th.

*Southern plateau.*—3d, 11th, 20th, 21st, 23d, 25th, 28th, 29th, 30th.

*Northern plateau.*—10th.

Thunder-storms were also reported from the following states not included in the districts named above:

*California.*—Angel Island, 8th; Poway, 30th; Red Bluff, 13th, 16th, 17th, 18th.

*Colorado.*—Fort Garland, 3d, 27th, 28th.

*Nevada.*—Carson City, 14th; Pioche, 10th, 12th.

*Texas.*—Eagle Pass, 1st, 2d, 6th, 9th, 10th; Uvalde, 9th.

*Utah.*—Coalville, 1st, 2d, 3d, 27th, 28th; Nephi, 13th, 16th, 30th; Salt Lake City, 13th, 16th.

The following are some of the most important instances of damage by lightning that have occurred during June:

*Hutchinson, Kansas, 6th.*—The Hazard Powder Company's magazine, containing 1,300 pounds of powder, was struck by lightning at 3.30 a. m. of the 6th. The explosion which resulted broke nearly all the window-glass in the city and moved several buildings from their foundations.

*Worcester, Massachusetts.*—During a heavy thunder-storm of the 6th the tower of the Holy Cross College was struck by lightning and set on fire.

*Ashland, Schuylkill county, Pennsylvania.*—During a thunder-storm on the night of the 8th a large rock on Locust moun-

tain was struck by lightning and shivered to atoms. A house near by was entirely demolished by the flying fragments of rock. Several houses were also struck by lightning, killing one person and fatally injuring four others.

Ravanna, Mercer county, Missouri.—Three men were killed by lightning near this place on the 14th.

Norwich, Connecticut.—At 5.30 p. m., of the 22d, a barn was struck by lightning and consumed by fire in a few minutes.

#### TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors at the Signal-Service stations, during June, 1883, with the average depth at which the observations were made, are given in the table below. Owing to the breakage of the instruments, observations were not made at Milwaukee, Wisconsin, from 3d to 21st, inclusive, and at Wilmington, North Carolina, from 9th to 21st:

Temperature of Water for June, 1883.

STATION.	Temperature at bottom.		Average depth, feet and inches.	Mean tempera-ture at station.
	Max.	Min.		
Atlantic City, New Jersey.....	71.6	58.6	13.0	67.2
Alpena, Michigan.....	67	53.8	13.2	58.7
Augusta, Georgia.....	87.5	78.3	9.2	79.0
Baltimore, Maryland.....	78	66	12.0	74.6
Block Island, Rhode Island.....	63.5	53.1	10.4	64.4
Boston, Massachusetts.....	64.7	57.0	7.7	69.0
Buffalo, New York.....	70.2	55	15.2	65.8
Burlington, Vermont.....	66.6	55	5.6	60.9
Cedar Keys, Florida.....	86.8	82.6	6.2	82.1
Charleston, South Carolina.....	85.1	74.8	10.3	80.3
Chicago, Illinois.....	66.2	52.3	13.9	64.1
Chincoteague, Virginia.....	80	70	10.0	70.6
Cleveland, Ohio.....	72.0	57.3	14.7	67.3
Detroit, Michigan.....	68	59	12.0	67.9
Delaware Breakwater, Delaware.....	70.8	61.0	9.8	69.0
Duluth, Minnesota.....	62.1	43.5	18.6	59.4
Eastport, Maine.....	46.1	40.7	5.4	57.5
Escanaba, Michigan.....	64.3	47.0	17.3	59.4
Galveston, Texas.....	88	79	9.0	82.9
Grand Haven, Michigan.....	75.3	63.2	12.1	62.1
Indiana, Texas.....	87.5	80.4	7.1	82.1
Jacksonville, Florida.....	87.5	78.0	9.5	80.9
Key West, Florida.....	89.0	82.3	6.7	83.8
Mackinaw City, Michigan.....	61.7	42.4	19.3	58.9
Marquette, Michigan.....	51	44	7.0	57.3
Milwaukee, Wisconsin.....	64.4	45.6	18.8	62.1
Mobile, Alabama.....	86	70	10.0	81.3
New Haven, Connecticut.....	74.7	62.5	12.2	68.3
New York City.....	71.5	61.5	10.0	69.5
Norfolk, Virginia.....	80.6	70.0	10.6	76.9
Pensacola, Florida.....	83.5	75.4	8.1	80.1
Portland, Maine.....	59.5	46.0	12.5	66.4
Provincetown, Massachusetts.....	71.5	59	12.5	66.7
Punta Rassa, Florida*.....	91.0	81.6	9.4	81.0
Sandy Hook, New Jersey.....	69.6	56.2	13.4	70.3
San Francisco, California.....	64.5	56.5	9.0	59.9
Savannah, Georgia.....	84.8	75.6	9.2	81.2
Smithville, North Carolina.....	84	74	10.0	77.2
Toledo, Ohio.....	70.7	60.6	16.1	69.7
Wilmington, North Carolina†.....	81.8	72.4	9.4	73.6

\* A station discontinued on the 15th.

† Observations incomplete. See text.

#### OPTICAL PHENOMENA.

##### SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—8th, 9th, 15th, 16th, 18th, 27th, 29th.

Middle Atlantic states.—2d, 4th, 6th, 21st, 24th, 28th.

South Atlantic states.—3d, 4th, 7th, 10th, 21st, 22d, 24th.

Tennessee.—4th, 7th, 9th, 12th, 15th, 22d, 28th.

Ohio valley.—5th, 15th.

Lower lakes.—3d, 5th, 7th, 8th, 12th, 15th, 21st, 24th.

Upper lakes.—2d, 5th, 8th, 12th, 14th, 15th, 20th, 21st.

Extreme northwest.—2d, 3d, 4th, 7th.

Upper Mississippi valley.—1st, 2d, 4th, 6th, 8th, 12th to 16th, 20th, 23d, 24th, 25th, 28th.

Missouri valley.—3d, 4th, 6th, 7th, 11th, 14th, 16th, 23d, 27th, 28th.

Solar halos were also observed at the following stations not included in the districts named above: Lead Hill, Arkansas, 2d, 4th, 6th to 9th, 17th, 19th, 23d, 27th; Princeton, California, 5th; Sacramento, California, 8th, 17th; San Francisco, California, 8th, 17th; Visalia, California, 1st, 5th, 9th; Prescott,

Arizona, 7th, 9th; Pike's Peak, Colorado, 9th; Punta Rassa, Florida, 7th; Pensacola, Florida, 4th, 6th, 9th, 13th, 26th; Lewiston, Idaho, 1st, 5th, 8th; Albany, Oregon, 2d, 22d; Roseburg, Oregon, 2d, 8th, 18th, 22d; Carson City, Nevada, 17th; Indianola, Texas, 3d; Palestine, Texas, 1st, 2d; Bainbridge Island, Washington Territory, 1st, 2d.

##### LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England.—10th, 14th, 15th, 17th, 18th.

Middle Atlantic states.—9th, 10th, 12th, 14th to 18th, 24th.

South Atlantic states.—9th, 10th, 17th, 21st.

Eastern Gulf.—13th, 16th, 19th, 20th, 21st, 24th.

Western Gulf.—11th to 22d.

Tennessee.—12th, 16th, 20th, 22d, 22d, 24th.

Ohio valley.—11th, 15th, 16th, 17th, 20th, 22d, 23d.

Upper lakes.—11th, 14th, 15th, 16th, 18th, 19th, 20th.

Upper Mississippi valley.—14th to 17th.

Lunar halos were also reported from the following stations not included in the districts named above: Visalia, California, 17th; Fort Buford, Dakota, 13th; Sanford, Florida, 11th, 17th; Saint Vincent, Minnesota, 21st; Kiantone, New York, 16th; Albany, Oregon, 14th; Fort Concho, Texas, 12th, 13th.

##### MIRAGE.

San Francisco, California, 5th.—A beautiful mirage was observed on the bay at 6 p. m., the vessels and the land on the opposite shore assuming peculiar shapes. Small schooners in the northern part of the bay appeared very large, and the shipping and ferry-boats in the harbor appeared with inverted images, one above the other.

New York City, 13th.—On this date a very unusual phenomenon was observed in this city and vicinity. The hulls of vessels assumed prodigious proportions, at times appearing to rise above the hills beyond them. There were many startling changes in the appearance of the familiar Coney Island landscape. At one time the entire village appeared doubled, the buildings being reflected upside down.

Mirage was also observed at the following stations:

Traverse City, Michigan, 29th, 30th.

Indianola, Texas, 3d, 24th, 26th.

##### MISCELLANEOUS PHENOMENA.

###### SUN SPOTS.

The following record of sun spots for the month of June, 1883, has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:

Date— June, 1883.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.	Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots		
1, 9 a. m.	0	16‡	0	0	1	0	2	20‡
2, 9 a. m.	1	5	0	0	1	2	3	25‡
4, 11 a. m.	1	25‡	0	0	0	0	4	50‡
4, 4 p. m.	0	0	0	0	0	0	4	50‡
5, 12 m.	0	0	0	0	0	0	4	50‡
5, 6 p. m.	1	5	0	0	1	5	5	55‡
6, 12 m.	0	0	0	10‡	0	0	5	45‡
8, 12 m.	1	10‡	1	20‡	1	10‡	5	30‡
9, 10 a. m.	0	0	0	0	0	0	5	30‡
10, 12 m.	0	0	1	5	0	0	4	15‡
11, 6 p. m.	1	2	2	3	1	2	3	14‡
12, 12 m.	0	0	1	2	0	0	2	12‡
15, 3 p. m.	1	2	0	0	0	0	3	14‡
16, 9 a. m.	0	0	0	4	0	0	3	10‡
17, 12 m.	2	4	0	0	1	2	5	14‡
19, 5 p. m.	0	15‡	1	5	0	0	4	25‡
20, 12 m.	0	15‡	0	0	0	0	4	40‡
21, 12 m.	0	10‡	0	0	0	0	4	50‡
22, 11 a. m.	1	3	0	10	1	3	5	40‡
23, 12 m.	0	5	0	5	0	5	4	40‡
24, 12 m.	1	7	1	5	0	5	4	50‡
25, 4 p. m.	2	10‡	0	0	2	10‡	6	50‡
26, 12 m.	0	0	5	0	0	5	40‡	
28, 12 m.	0	10‡	1	5	0	0	4	45‡
29, 11 a. m.	0	5	0	0	0	0	4	50‡
30, 9 a. m.	0	0	0	5	0	0	4	45‡

Two of spots quite large.  
Do.  
Do.

Faculae were seen at the time of every observation. ‡Approximated.

Mr. H. D. Gowey, at North Lewisburg, Ohio, reports that sun spots were observed on all clear days during the month.

They were most numerous on the 6th and 27th; least numerous on the 18th; largest on the 5th, and 29th; smallest on the 11th.

#### SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal-Service stations. Reports from one hundred and seventy-one stations show 4,786 observations to have been made, of which three were reported doubtful; of the remainder, 4,783, there were 4,002, or 83.7 per cent., followed by the expected weather.

#### METEORS.

Nashville, Tennessee.—At 10 p. m. of the 1st a bright meteor was observed to pass from the zenith toward the southwestern horizon, leaving a path of reddish-yellow color, which remained visible for twenty seconds.

Sussex, Wausheka county, Wisconsin.—At 9.15 p. m. of the 1st, a brilliant meteor—apparently larger than Venus—was observed in the southern sky; it moved slowly downward for a distance of 15° and disappeared.

Keokuk, Iowa, 5th.—At 6 p. m. of this date a brilliant meteor was seen in the southwestern sky, moving southeastward at an angle of about 45°. Although the sun was shining brightly, the meteor and its luminous path were plainly visible. No cloud was observed at its disappearance.

Washington, District of Columbia:—At 8:40 p. m. of the 27th, a meteor, remarkable for its brilliancy, passed from a point near the zenith toward the northern horizon. The color of the light produced strongly resembled that of the electric light and was sufficiently brilliant to cast clearly defined shadows.

Woodstock, Baltimore county, Maryland.—A meteor of unusual brilliancy was observed at this place at 8:30 p. m. of the 27th. It was visible for about eight seconds and moved directly northward from near the zenith toward the northern horizon.

Fallston, Harford county, Maryland.—At about 9:00 p. m. of the 27th, a meteor was observed to pass from a point near the zenith toward the northern horizon. It produced a brilliant light, making the smallest objects plainly visible. The meteor was observed by many persons in this locality, and was also seen in Baltimore, and at Sandy Springs, Montgomery county.

Variety Mills, Nelson county, Virginia.—A brilliant meteor was observed at this place on the 27th, at 8:45 p. m. It appeared in the northeastern sky and was apparently twice the size of venus, and left behind it a trail of white light.

Mobile, Alabama.—At 8:45 p. m. of the 29th, a meteor appeared in the eastern sky at an elevation of about 15°, and passing northward, disappeared at an altitude of about 5°. Before disappearing the meteor separated into three distinct parts, which were much more brilliant than the meteor at its first appearing.

Meteors of less brilliancy were reported to have been observed during the month, as follows:

2d.—Logansport, Indiana, during the early morning.

3d.—Stateburg, South Carolina; Lead Hill, Arkansas; Yuma, Arizona.

4th.—Toledo, Ohio; Polo, Illinois; Visalia, California.

5th.—Rowe, Massachusetts.

6th.—Beloit, Wisconsin.

7th.—Visalia, California.

9th and 10th.—Clear Creek, Nebraska.

11th.—Bordentown, New Jersey.

12th.—Visalia, California; Rowe, Massachusetts.

13th.—Davenport, Iowa.

14th.—Williamstown, Massachusetts; Lead Hill, Arkansas.

19th.—Memphis, Tennessee.

20th.—Genoa, Nebraska; Memphis, Tennessee.

21st.—Saint Vincent, Minnesota.

22d and 23d.—Griffin station, Indiana.

24th.—Fort Scott, Kansas.

26th.—Yates Centre, Kansas.

27th.—Salina, Kansas.

28th.—Murfreesboro, Tennessee.

29th.—Fort Scott, Kansas; Salina, Kansas; Green Springs, Alabama.

30th.—Boston, Massachusetts; Salina, Kansas.

#### EARTHQUAKES.

The following notes upon earthquakes have been furnished by Professor C. G. Rockwood of Princeton, New Jersey:

Panama. United States of Colombia, July 5th.—At daylight on June 3, 1883, a strong and somewhat prolonged earthquake was experienced at Callao, Peru; it did no damage, although it caused much alarm among the townspeople. At 1.30 a. m. of the same date a much slighter movement was felt in Lima.

Panama, June 23d.—The volcano of Ometpe, in Lake Nicaragua, is at present in eruption, much to the alarm of the residents on the island which is formed by it. On May 1st, at 10 a. m., a frightful and terrifying subterranean rumbling was heard, which lasted between two and three minutes, but no outbreak was visible. On the following day a number of people climbed to the summit of the volcano to find that the crater had increased in size and was about thirty-five yards in length and three yards in width, but its depth could not be calculated. Around it were strewn large quantities of stones and rock covered with slate-colored mud, and ashes were scattered in all directions.

Two days afterwards, on May 4th, a series of terrifying eruptions, accompanied by a prolonged rumbling, occurred. About 2.30 p. m., the earth and rock in the vicinity of the crater were seen to break, lava flowed forth, and from it there burst up a thick column of lead colored smoke, which sent the terrified villagers flying to the churches in the belief that the whole island was about to be destroyed. No damage, however, was done.

The valley of the Altrato, situated in the state of Cauca, in this republic, continues a centre of that volcanic activity first evinced there in September of last year.

At Rio Sucio, about forty miles from the Atlantic, the earth cracked and opened in many places, throwing out very fine sand in a heated state, while a subterranean noise was heard.

At Turbo, on the gulf of Uraba, the earth opened and water flowed out, flooding the streets to a depth of two feet. Many houses were shaken down. The small villages of Bujies and Nieurio have been completely engulfed. The mouth of the river Leon, which emptied into the Atlantic, has completely closed up, and all over the district, the movement of the earth is so continuous that the inhabitants are immigrating.

On the 21st, at 7 a. m. a slight earthquake was felt at Mompos, on the river Magdalena, in the state of Bolivar, which was followed by a sharper one at 2.00 a. m. of the 22d, on which day shocks were also felt at San Salvador and Guayaquil.

#### WATER-SPOUTS.

The "Marine Record" (published in Cleveland, Ohio,) of June 23, 1883, reports that three water-spoouts were recently observed southeast of Turtle light. Within thirty minutes, the water was observed to take a whirling motion at three different points and was quickly sucked up, appearing like a light smoke from the stack of a steamer. The water-spool assumed the shape of an inverted cornucopia and were apparently one-fourth mile in height. They were carried along with great force, rotating rapidly, until striking the clouds, when they disappeared. The tug "Farragut" reported that these water-spoouts possessed marked peculiarities and differed widely from any ever before observed.

Sanford, Florida: at 4 p. m. of the 13th, a water-spool of about one hundred feet in height was observed on Lake Monroe. It moved in a westerly direction for several hundred yards, when it suddenly disappeared.

The schooner "Jennie N. Huddell" saw a large water-spool

in latitude N.  $35^{\circ} 35'$ , longitude W.  $75^{\circ} 15'$ , at 5.10 a. m. of the 25th.

## SAND-STORMS.

Fort Thomas, Arizona, 8th, 9th, 15th, 28th.

Yuma, Arizona, 10th.

Turlock, California, 30th.

Lewiston, Idaho, 4th.

## POLAR BANDS.

Lead Hill, Arkansas, 11th, 20th, 25th, 27th, 30th.

Riley, Illinois, 19th.

Wabash, Indiana, 19th.

Salina, Kansas, 5th, 15th.

Saint Louis, Missouri, 8th.

Clear Creek, Nebraska.

Vineland, New Jersey, 2d.

Charleston, South Carolina, 10th.

Nashville, Tennessee, 15th, 23d.

Woodstock, Vermont, 29th.

Cape Henry, Virginia, 1st.

Wytheville, Virginia, 4th, 17th, 21st.

## ZODIACAL LIGHT.

Prescott, Arizona, 1st to 7th, 26th, 27th, 28th.  
Pensacola, Florida, 30th.

*Abstract of meteorological observations for the month of June, 1883, as reported to the Bureau of Agriculture, &c., of Tennessee, by voluntary observers in co-operation with General W. B. Hazen, Chief Signal Officer, U. S. A.*

County.	Station.			Temperature.					Wind.		Number of days—						Observers.								
		Latitude north.	Longitude west of Washington.	Mean of 7 a. m.	Mean of 2 p. m.	Mean of 9 p. m.	Average monthly.	Prevailing direction.	Greatest force, Scale 0 to 10.	Date,	Fair,	Cloudy,	Aurora,	Dew,	Fog,	Front,	Lunar halos,	Solar halos,	Thunderstorms,	Hailstorms,	On which rain fell, including rainfall, snow, and sleet,	Total rainfall, including hail, snow, and sleet (in inches).			
Anderson	Andersonville	36° 10'	80° 45'	65°	71°	71°	90°	17	1	SW.	br.	.....	2	17	II	.....	2	6	.....	2	1	12	5.22	J. K. P. Wallace.	
Bedford	Flat Creek	35° 30'	94° 40'	71°	78°	70°	73°	89°	25	I	SW.	br.	24	.....	23	4	.....	16	15	.....	15	6.34	William Hart.		
Blount	Maryville, 960 ft.	35° 45'	7° 00'	71°	72°	72°	91°	25	5	I	W.	br.	4	3	15	II	.....	2	9	.....	9	5.14	W. H. Henry.		
Bradley	Grief	35° 11'	7° 42'	69°	71°	74°	93°	30	59	I	W.	br.	22	1	21	III	8	.....	7	10	.....	7	5.34	J. T. Cowden.	
Campbell	Caryville	36° 00'	7° 30'	66°	78°	70°	85°	12	51	I	W.	br.	5	2	11	17	7	.....	10	4.74	Fletcher Smith.				
Carroll	McKenzie, 815 ft.	36° 10'	11° 30'	74°	89°	75°	79°	94°	17	55	I	SW.	br.	5	21	15	5	10	14	.....	3	8	3.05	John Brown.	
Chantham	Kington Springs	36° 10'	10° 04'	73°	83°	75°	77°	91°	24	59	I	SW.	br.	9	6	17	7	11	4	1	1	13	4.83	W. J. Inman.	
Coffee	Beech Grove, 1,050 ft.	35° 30'	9° 06'	64°	81°	71°	72°	85°	23	58	27	SW.	h.	24	10	8	11	2	1	1	7	11	6.53	B. F. Chestham.	
Coffee	Manchester	35° 20'	9° 04'	69°	80°	70°	73°	89°	24	54	I	SW.	h.	10	2	14	14	5	.....	11	10	.....	11	5.73	Wiley Hickerson.
Cumberland	Grassy Cove	36° 00'	8° 00'	61°	74°	64°	65°	86°	16	57	I	S.	br.	7	2	15	8	5	3	7	9	4.39	Nettie M. Stratton.		
Crockett	Gadsden	35° 45'	12° 00'	72°	83°	73°	76°	93°	24	58	I	SW.	br.	21	6	16	2	.....	10	3.95	M. T. Moore, (27 d's)				
DeKalb	Smithville	35° 50'	8° 40'	69°	80°	77°	75°	86°	18	61	I	SW.	br.	4	6	11	13	6	1	2	6	10	4.00	P. C. Bluhm.	
Dickson	White Bluff	36° 10'	10° 04'	73°	80°	70°	76°	90°	30	60	9	S.	br.	15	14	7	9	4	.....	8	4.40	Prof. McMillan.			
Dyer	Dyersburg	36° 15'	12° 20'	71°	83°	71°	75°	90°	16	58	I	S.	br.	17	6	5	19	18	1	8	13	4.70	L. Hughes.		
Gibson	Trenton	35° 58'	11° 58'	69°	81°	71°	74°	86°	30	61	14	SW.	h.	8	22	3	21	6	5	4	10	12	.....	A. S. Curry.	
Giles	Milan, 440 ft.	35° 55'	11° 47'	69°	83°	72°	74°	93°	16	50	I	S.	br.	5	21	11	8	20	12	16	16	4.58	M. D. L. Jordan.		
Greene	Greeneville	36° 10'	7° 49'	70°	82°	75°	75°	86°	15	55	I	SW.	br.	16	7	7	7	2	.....	13	6.08	Prof. W. T. Mann.			
Hawkins	Bogessville	35° 32'	5° 57'	55°	60°	59°	60°	73°	27	13	62	SW.	h.	4	25	4	12	14	1	1	3	12	5.59	E. Link.	
Hardeman	Bolivar	35° 18'	12° 00'	70°	83°	77°	77°	90°	17	59	I	S.	br.	22	14	5	8	1	1	3	11	4.15	Thos. F. Walker.		
Hardin	Savannah	35° 20'	11° 40'	65°	78°	68°	70°	91°	24	53	I	SW.	h.	6	22	17	5	8	3	4	5	9	6.08	E. P. McNeal.	
Haywood	Brownsville	35° 36'	12° 20'	76°	84°	77°	79°	97°	18	53	I	W.	br.	18	12	.....	12	11	.....	11	6.42	H. R. Hinkle.			
Henry	Paris	36° 33'	11° 25'	71°	73°	72°	74°	84°	24	63	I	SW.	h.	22	8	10	12	.....	10	10	.....	10	1.83	Daniel Bond.	
Humphreys	Waverly	36° 00'	10° 45'	68°	78°	77°	76°	86°	17	54	I	SW.	h.	3	11	16	16	.....	9	9	.....	9	3.03	J. J. Travis.	
Lincoln	Howell	35° 15'	9° 30'	70°	83°	70°	75°	91°	24	60	I	S.	br.	24	9	21	8	1	1	15	6.03	D. R. Owen.			
Lauderdale	Flippin	35° 45'	12° 30'	72°	81°	76°	76°	92°	24	63	II	S.	br.	22	3	14	13	2	.....	8	.....	O. B. Hatcher.			
Marion	Fostoria, 1,200 ft.	35° 10'	8° 50'	63°	80°	64°	69°	85°	16	48	I	W.	h.	12	19	11	11	11	1	11	10	1.90	W. P. H. Butler.		
Maury	Hardison's Mills	35° 10'	10° 00'	70°	79°	73°	73°	90°	17	58	I	SW.	.....	4	10	16	3	1	4	1	3	14	7.53	Charles Foster.	
McMinn	Chuckaluck	35° 30'	7° 30'	63°	83°	71°	72°	93°	19	47	I	W.	br.	12	16	3	13	1	2	8	3.79	Calvin Hardison.			
McNairy	McNairy Station	35° 00'	12° 00'	75°	86°	76°	79°	92°	16	68	2	S.	h.	21	8	12	10	6	4	5	5	2.25	Jacob Zeigler.		
Montgomery	Sailor's Rest	36° 24'	10° 35'	76°	84°	76°	76°	93°	24	60	II	SW.	.....	4	12	14	12	1	1	12	3.70	J. H. Blakely.			
Overton	Livingston, 966 ft.	36° 23'	8° 17'	69°	80°	69°	70°	88°	24	57	I	SW.	br.	8	9	13	3	1	1	10	10	3.90	John Minor.		
Polk	Benton, 880 ft.	35° 10'	7° 45'	71°	73°	71°	71°	96°	23	55	I	SW.	br.	8	20	12	17	68	2	11	7	3.59	J. Langlin, (26 d's)		
Rutherford	Florence Station	35° 53'	9° 29'	71°	85°	72°	76°	93°	24	62	I	SW.	.....	7	11	12	10	.....	12	7.05	Jim Hood.				
Rhea	Grand View, 1,635 ft	35° 45'	7° 48'	67°	78°	66°	70°	88°	18	57	I	SW.	h.	20	9	11	10	25	5	3	4	9	3.72	C. F. Vandeford.	
Smith	Near Alexandria	35° 30'	8° 56'	75°	73°	74°	74°	90°	19	60	I	S.	h.	18	3	2	25	13	4	4	5	12	Hattie R. Stratton.		
Rutherford	Riddleton	36° 19'	9° 07'	70°	81°	72°	74°	92°	23	55	I	SW.	h.	20	3	16	11	6	4	4	1	5	Irenus Beckwith.		
Tipton	Covington	35° 30'	12° 38'	76°	83°	72°	76°	93°	16	59	I	S.	br.	15	5	10	.....	.....	3	8	4.05	S. P. Fergusson.			
Williamson	Franklin	36° 00'	10° 00'	70°	81°	73°	75°	89°	24	56	I	S.	br.	3	8	19	1	.....	2	12	4.31	T. W. Roane.			
Warren	McMinnville	35° 45'	8° 45'	74°	83°	76°	78°	84°	17	63	I	S.	br.	10	11	9	3	.....	10	1.29	Samuel Henderson.				
																						B. W. Sparks.			

Mean temperature,  $73^{\circ}$ .

Highest temperature,  $97^{\circ}$ , on the 18th at Brownsville.

Lowest temperature,  $47^{\circ}$ , on the 1st at Chuckaluck.

Range of temperature,  $50^{\circ}$ .

Mean daily range of temperature,  $16^{\circ} 66$ .

Greatest daily range of temperature,  $34^{\circ}$ , on the 1st at Fostoria.

Least daily range of temperature,  $1^{\circ}$ , on the 7th at Hardison's Mills, and

on the 10th at Kingston Springs.

Mean depth of rain or melted snow, 4.77 inches.

Greatest depth of rain or melted snow, 8.32 inches at Alexandria.

Least depth of rain or melted snow, 1.29 inches at McMinnville.

Average number of clear days,  $7\frac{1}{2}$ .

Average number of fair days, 10 $\frac{2}{3}$ .

Average number of cloudy days, 11 $\frac{2}{3}$ .

Average number of days on which rain or snow fell, 10 $\frac{1}{2}$ .

Prevailing direction of wind, Southwest.

The "Missouri Weather Service," has issued the following report for June, 1883:

The mean temperature of the past month has been at the central station, 72°.9 which is 1°.6 below the normal of Mr. Engelmann's series. The average temperature throughout the state has been low for the month. The greatest change for any one day at the central station was on the 29th, when there was a range of 23°.9. The extremes for the month were 54°.6 for the minimum, on the 1st, and also on the 14th, and for the maximum, 89°.7 on the 29th. Cairo and Greenfield (both south) are the only stations reporting temperatures above the Saint Louis normal.

The rainfall throughout the state has been remarkably heavy. The amount for the month recorded has been at every station greater than the mean rainfall for June, according to Mr. Engelmann's series for Saint Louis, excepting the central station, Harrisonville, and O'Fallon. While we might expect local results from heavy rainfalls, yet it is to the wide-spread rains of

the past month that we must attribute the great floods that have done so much damage throughout the bottoms of the large rivers, as well as the local creek bottoms. It has been heaviest in the northwestern part of the state, gradually decreasing as we follow down the Missouri river bottoms to Saint Louis. The rainfall on the night of Saturday, the 17th, around Savannah, was greater than ever known there before for the same length of time. It has been exceeded only four times in Mr. Engleman's "heaviest rainfalls" for Saint Louis. At Louisiana there was a very heavy rainfall on the 16th, and on the 21st, a remarkably severe thunder-storm. It has been a remarkable feature of the storms of the past month, that the barometer has not generally shown the change that might have been expected to precede such results.

The storm of the 15th, was accompanied with hail in the western part of Saint Louis. Hail was also reported at Lexington on the 15th, and at Miami on the 20th.

On the 18th, DeKalb county suffered from a very severe cyclone. On the 22d, a cyclone originated in the northwestern part of the state, and traversed almost the entire state in a southeasterly direction. It extended over a wide tract of country, doing great damage to property.

Professor T. C. Mendenhall, of the "Ohio Weather Service," furnishes the following meteorological summary for June, 1883:

*Report of the Ohio meteorological bureau. Summary for the month of June, 1883.*

Number	Stations.	Counties.	Mean barometer.	Highest barometer.	Date.	Lowest barometer.	Date.	Range of barometer.	Mean relative humidity.	Highest temperature.	Date.	Lowest temperature.	Date.	Range of temperature.	Mean daily range of temperature.	Greatest daily range of temperature.	Date.	Least daily range of temperature.	Date.	Number of clear days.	Number of fair days.	Number of cloudy days.	Days on which rain fell.	Total rainfall for month.	Average daily rainfall.	Direction of wind.
1	Cincinnati	Hamilton	29.974	30.343	I 29.644	10 .699	67.7	°	89.5	17 57.0	I 32.5	15.1	24.0	2	7.0	22	7	14	9	21	3.61	.120	sw.			
3	Dayton	Montgomery	29.977	30.341	I 29.604	10 .737	70.0	70.4	88.0	24 40.2	I 41.9	17.1	27.0	2	13.2	17	5	15	7	13	5.69	.189	se.			
4A	Lima	Allison	29.977	30.377	I 29.633	10 .744	74.0	69.8	92.2	23 36.0	I 56.2	26.4	44.5	1	14.8	11	8	10	12	11	4.51	.150	sw.			
4B	Sidney	Shelby	.....	.....	.....	.....	80.0	67.6	82.2	16 38.0	I 51.2	25.3	38.0	2	11.7	26	5	16	9	15	5.27	.175	sw.			
5	Upper Sandusky	Wyandot	29.962	30.368	I 29.589	10 .779	73.0	69.4	86.5	16 39.0	I 47.0	19.9	34.0	2	10.5	27	3	2	5	17	6.31	.207	sw.			
6	Wauseon	Fulton	29.980	30.390	I 29.490	10 .800	79.0	70.4	87.9	17 34.5	I 52.8	23.8	39.4	2	6.7	10	3	13	14	18	4.73	.157	sw.			
7	Lebanon	Warren	.....	.....	.....	.....	78.0	70.6	84.8	18 47.1	I 57.7	16.7	31.0	2	7.7	2	10	10	10	17	7.28	.243	sw.			
8	N. Lewisburg	Champaign	.....	.....	.....	.....	74.0	70.1	86.2	18 44.5	I 41.7	17.6	32.5	2	5.0	6	15	9	18	6.20	.206	sw.				
9A	Levering	Knox	.....	.....	.....	.....	78.0	66.8	82.8	18 40.1	I 42.7	18.4	30.4	1	10.4	10	12	15	3	13	4.37	.145	sw.			
9B	Gambier	Knox	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.57	.086	.....			
10	Toledo	Lucas	29.896	30.339	I 29.508	10 .831	69.0	69.7	88.0	17 45.0	I 43.0	15.3	26.0	2	6.0	10	3	17	10	12	2.99	.100	s.			
11	Ironton	Lawrence	29.984	30.300	I 29.687	10 .613	71.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.30	.176	s.			
12A	Washington	Fayette	.....	.....	.....	.....	78.0	68.4	89.0	23 45.5	I 43.5	22.9	39.4	2	11.9	21	9	10	11	18	4.53	.151	s.			
12B	Waverley	Pike	.....	.....	.....	.....	76.0	71.1	90.0	18 45.0	I 45.0	25.8	39.0	16	11.2	5	8	15	7	15	3.93	.131	sw.			
13A	Columbus	Franklin	29.952	30.326	I 29.604	10 .733	68.8	68.8	89.0	5 48.0	I 41.0	18.0	28.0	2	9.0	21	8	18	4	17	4.25	.142	s.			
13B	O. S. University	Franklin	.....	.....	.....	.....	85.0	67.8	88.0	18 43.0	I 45.0	23.6	36.0	2	14.0	10	11	13	6	15	4.70	.156	sw.			
13C	Westerville	Franklin	29.952	30.325	I 29.596	10 .729	81.7	67.7	87.0	5 42.0	I 45.0	21.6	35.0	2	11.0	25	9	15	6	10	3.93	.131	sw.			
14	Oberlin	Lorain	29.967	30.361	I 29.639	10 .722	76.0	67.7	90.3	23 45.0	I 55.3	26.6	44.0	2	13.5	13	8	16	6	12	3.40	.113	s.			
15	Marietta	Washington	30.003	30.343	I 29.689	10 .654	78.0	70.6	85.0	5 48.3	I 39.7	20.4	35.2	2	10.6	7	9	10	11	14	3.29	.109	sw.			
16	Granville	Licking	.....	.....	.....	.....	74.0	68.6	86.0	10 43.0	I 43.0	21.1	35.5	13	12.0	21	11	5	4	5	1.87	.062	sw.			
17	Quaker City	Guernsey	.....	.....	.....	.....	76.0	69.7	87.0	5 42.0	I 45.0	21.8	34.0	14	11.0	11	9	10	11	18	3.64	.121	s.			
18	Canton	Stark	29.954	30.325	I 29.637	10 .688	75.0	67.7	86.0	17 40.0	I 46.0	21.8	35.7	14	13.4	7	19	4	14	4.10	.136	sw.				
19	Warren	Trumbull	.....	.....	.....	.....	75.0	68.5	89.2	17 40.0	I 49.2	22.0	34.3	14	12.0	15	5	16	9	14	3.19	.106	sw.			
20	Wooster	Wayne	29.966	30.344	I 29.633	10 .711	77.0	67.4	84.5	5 41.0	I 43.5	19.6	27.5	15	10.0	10	10	14	6	11	3.41	.113	s.			
21A	Cleveland	Cuyahoga	29.930	30.367	I 26.541	10 .826	69.1	67.3	85.5	18 44.4	I 41.1	16.2	30.2	2	7.3	27	9	15	6	17	3.77	.126	s.			
21B	Cleveland	Cuyahoga	.....	.....	.....	.....	66.9	57.0	88.0	18 42.5	I 44.5	19.6	33.0	2	10.0	11	7	15	8	17	3.90	.130	s.			
	State	.....	29.955	30.377	I 29.490	10 .887	75.5	69.0	92.2	23 34.5	I 57.7	20.69	44.5	1	5.0	25	8.5	13.7	7.8	14.5	4.25	.141	sw.			

NOTE.—The means are computed only from station reports covering the entire month, and when instruments have been compared with standards.

The following note is also taken from the report of the "Ohio Weather Service":

The railway weather signals were continued during June, and by examination of reports from Columbus, Westerville, Gambier, Wooster, and Canton, and special reports by Mr. S. H. Marchand, of Millersburg, it is found that eighty per cent. of the predictions have been verified.

The following summary has been forwarded by Mr. S. R. Thompson, director of the "Nebraska Weather Service":

The month was characterized by a very heavy rainfall, especially in the southern and eastern parts of the state, and by very hot weather in the last decade.

**Rainfall.**—The average by sections was as follows: southeast, 12.80 in.; northeast, 7.83 in.; southwest, 4.99 in.; northwest, 4.81 in. Average for entire state, 7.61 in.

**Temperature.**—The mean temperature of the air was 70.68. The average of all noon observations was 76.20. The following are some of the maximum and minimum temperatures: Omaha, maximum 95.0°, minimum 44.6°; North Platte, max. —, min. —; De Soto, max. 93.0°, min. 28°; Agricultural College, max. 96°, min. 42°.

**Mean relative humidity.**—Omaha, 69.3, North Platte —, Agricultural College 82.63, De Soto 60.3.

**Wind.**—Number of miles travelled—Omaha 2,255, North Platte —. Mean direction—Omaha north, North Platte —, Agricultural College west. Greatest velocity—Omaha 38 miles southeast. North Platte —.

**Miscellaneous.**—At Red Willow on the first the mercury fell from 92° to 60° in two hours and one-half and the wind whirled from southeast to southwest in 15 minutes, a swift breeze following. At the same place a brilliant sundog was seen north of the sun on the 9th. At Superior at 2 a. m. on the

24th a terrific storm of wind, thunder and lightning and hail occurred. About two inches of rain fell, and considerable damage was done to buildings, &c. Hail the size of peas fell at Syracuse on the 1st, doing great injury to crops.

G. W. Knights, observer at Inavale, Webster county, writes that on the 18th, at 3.35 p. m. a heavy storm of wind, hail, and rain entered the county at the southwest corner, passing in a northeasterly direction. The storm was from three to five miles wide. It did great damage to both fruit and forest trees, wrecked several buildings, and severely hurt a few people. He thinks the corn will recover and make a light crop.

At Table Rock the Nemaha was three feet higher than ever known before.

A heavy storm of wind, thunder and lightning, rain and hail on the 16th is reported at Sargent.

The following extract is taken from the report of the Illinois Meteorological Service for June, 1883.

#### SEASON.

June, 1883, was cooler than the same month in 1880, 1881, and 1882. The average rainfall at stations in the three divisions of the state, for June, 1883, of 5.85 inches was not as heavy as the precipitation of June, 1881 and 1882, but considerably more than for the corresponding month in 1878, 1879, and 1880.

The past month was cooler and the precipitation greater than that of the average of the month of June for a term of years.

#### TEMPERATURE.

The mean temperature for the past six Junes in the three divisions of the state is given in the following table:

Division.	1878.	1879.	1880.	1881.	1882.	1883.
Northern .....	67°.0	65°.0	70°.0	66°.0	68°.2	67°.3
Central .....	68°.0	70°.0	73°.0	71°.4	71°.3	69°.1
Southern .....	72°.0	73°.0	73°.0	74°.5	74°.4	72°.7
Average.....	69.0	69.3	72.0	70.7	71.3	69.7

*Northern division.*—The mean temperature of June, 1883, at stations in the northern division of the state is a fraction warmer than the average of the past six years.

The month of June, 1879, was the coolest, and June, 1880, the warmest since 1877, at stations in this division.

The mean temperature in the northern counties for the period from January 1 to June 30, 1883, was lower than for the corresponding periods of the past six years.

*Central division.*—At the several stations in this division, the mean temperature of June, 1883, with the exception of June, 1878, was the coolest June on record. The mean temperature of June, 1880, was the highest, and that of June, 1878, was the lowest of any corresponding month at the stations in the central counties since 1877. The mean temperature of this division for the six months ending June 30, 1883, was lower than the corresponding periods since 1877, with the exception of 1881.

*Southern division.*—The mean temperature of June, 1878, was a fraction lower than the mean temperature of June, 1883, in this division. The mean temperature of June, 1878, was the lowest, and June, 1881, was the highest since 1877. The mean temperature of the southern counties for the six months ending June 30, 1883, has not been lower in any corresponding period during the past six years, and is the same as in 1881.

#### RAINFALL.

There was, with one exception (June 1st), rain on every day during the past month in some portions of the state. The rains were quite general over the state on the 2d, 6th, 8th to 12th, 15th to 18th, 20th, 21st, 23d, 25th, 27th and 28th. There were local rains at stations in the northern counties on the 3d; at points in the southern division of the state on the 13th, 14th, 19th, 22d and 30th. The average number of days on which rain fell at the several stations in the month of June was, as follows: northern division, 9; central division, 13; southern division, 10. The heaviest rainfall reported for June was 8.8 inches, at Griggsville, Pike county; the smallest, 3.15 inches, at Pana, in Christian county; while the average precipitation in June for all the stations in the state was 5.85 inches.

The following table gives the average amount of rainfall in the three divisions of the state during the last six Junes.

Division.	1878.	1879.	1880.	1881.	1882.	1883.
Northern .....	3.41	3.93	5.32	7.86	7.55	4.67
Central .....	3.69	2.80	2.64	7.35	10.08	5.98
Southern .....	2.29	4.59	3.63	4.58	5.76	6.91
Average.....	3.13	3.77	3.86	6.59	7.78	5.85

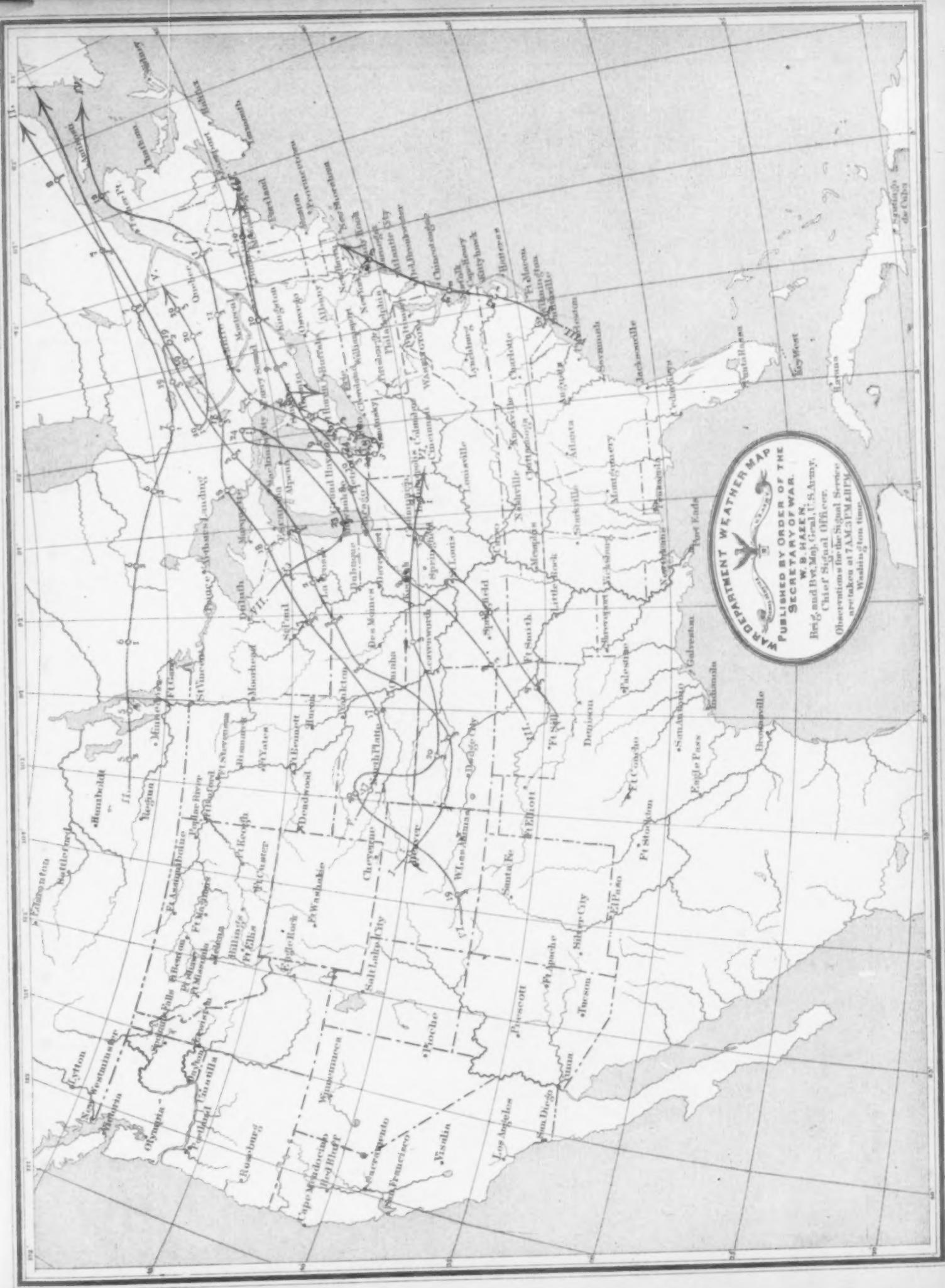
The average rainfall at stations in the southern division during the month of June, 1883, exceeded that of June during the past six years.

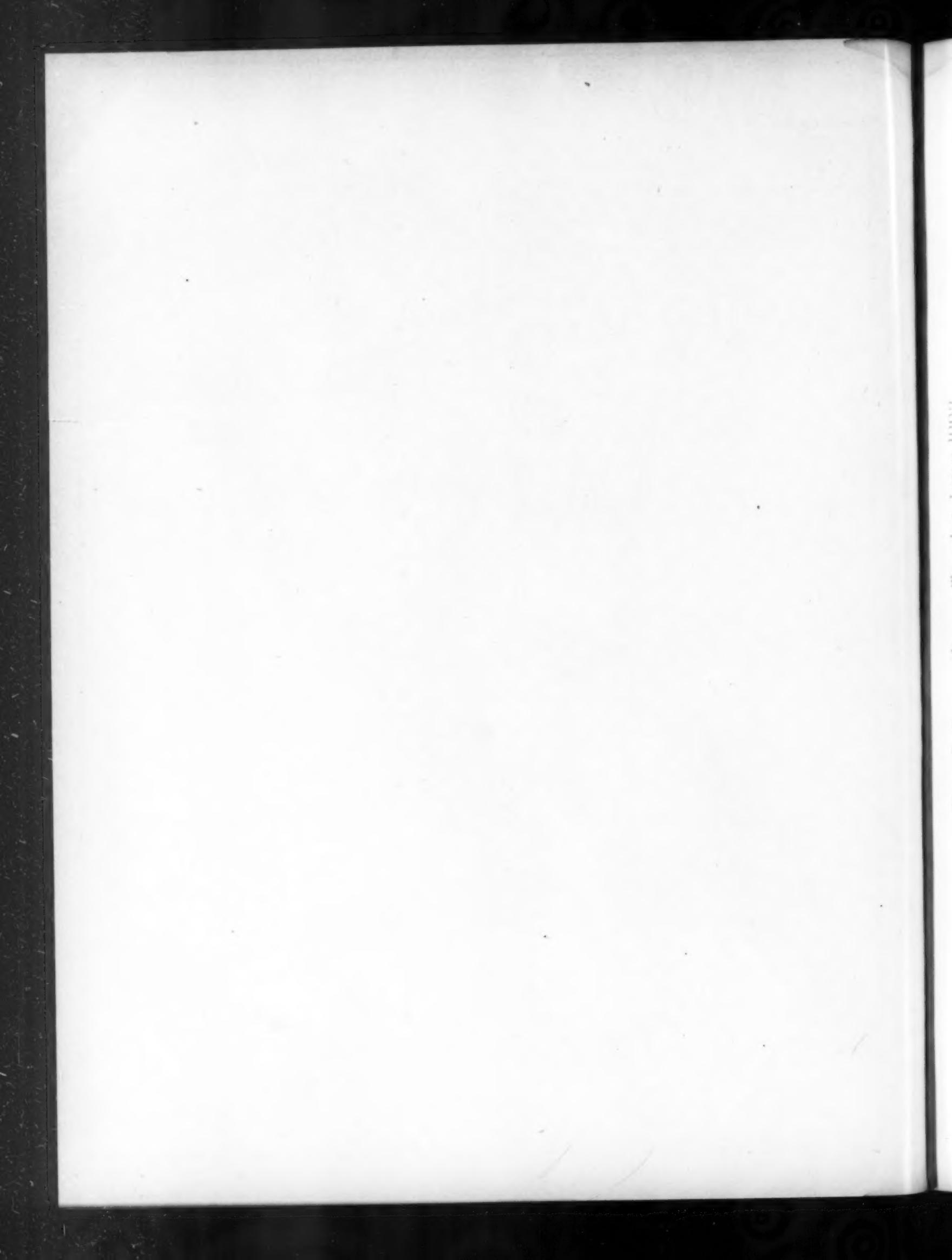
The average precipitation of 5.85 inches for all stations in the state was exceeded in 1881 and 1882, in which years the averages for the state were 6.59 and 7.78 inches respectively.





Chart A. Tracks of Low-Barometer Areas, June, 1893.





Chair H. Ocean Storm Triangles, June 16, 1933.

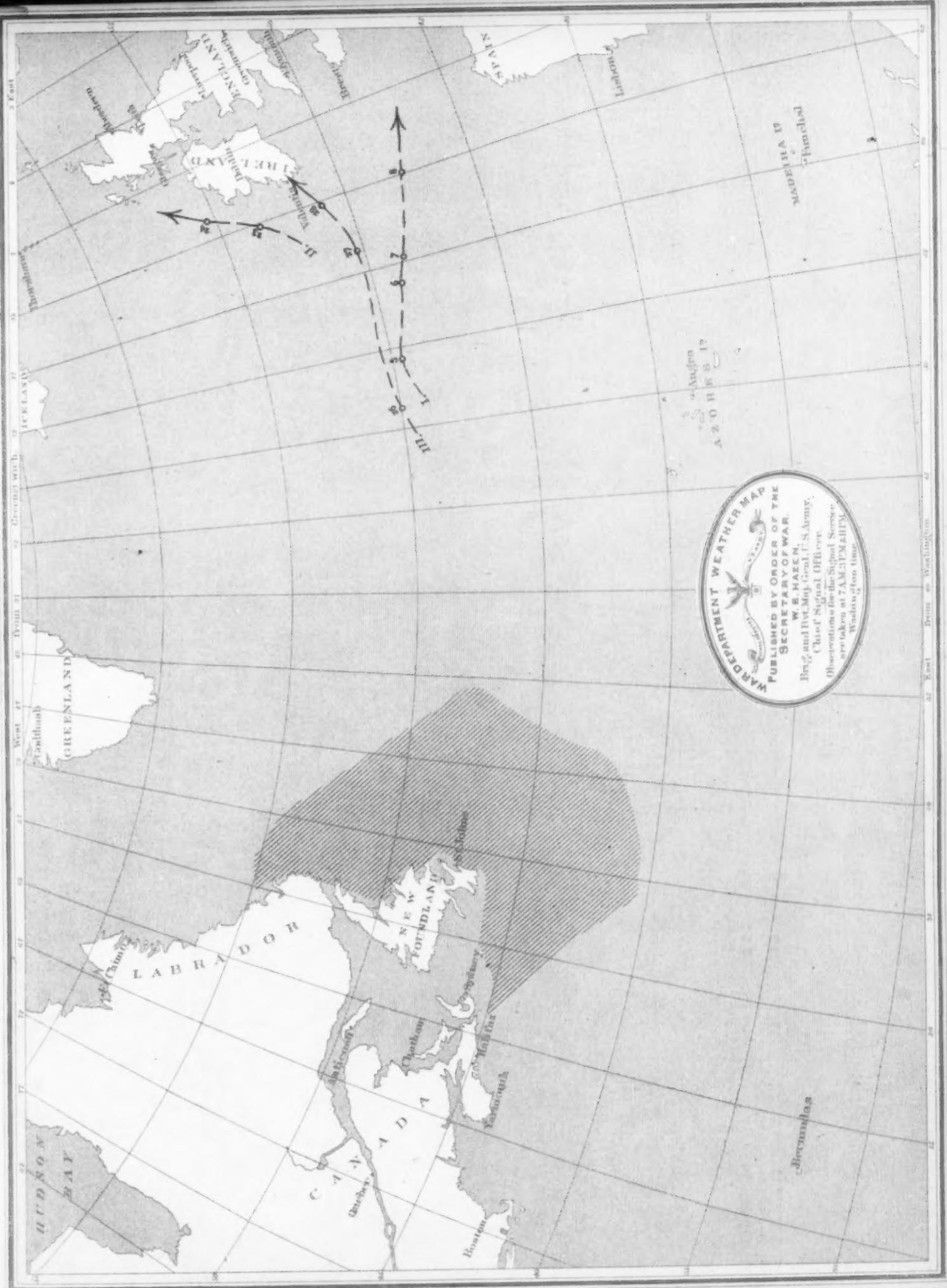




Chart III. Isobars, Isotherms, and Winds, June, 1863.

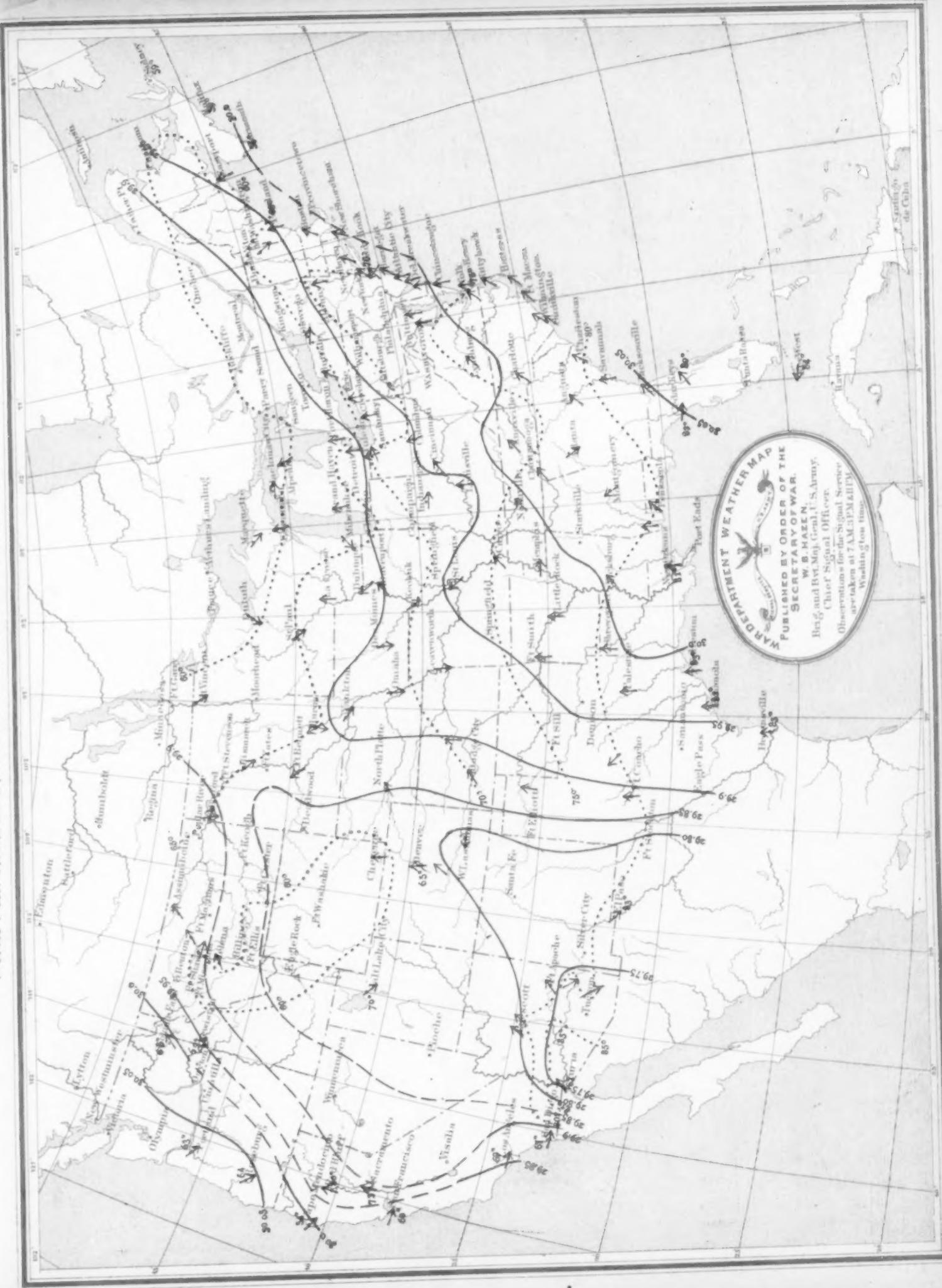


Chart IV. Precipitation, June, 1855.

Chart IV. Precipitation, June, 1883.

